Enabling Anytime Anywhere Access

Dataradio Vanguard 3G™

(CDMA Version)

Rugged Cellular Radio Modem

User Manual

P/N 001-7100-100 Version 0

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1. PREFACE

1.1 Copyright Notice

©2009 CalAmp Corp. All Rights Reserved.

This manual covers the operation of the CalAmp Dataradio Vanguard 3G CDMA Cellular Modem. Specifications described are typical only and are subject to normal manufacturing and service tolerances.

CalAmp reserves the right to modify the equipment, its specifications or this manual without prior notice, in the interest of improving performance, reliability, or servicing. At the time of publication all data is correct for the operation of the equipment at the voltage and/or temperature referred to. Performance data indicates typical values related to the particular product.

No part of this documentation or information supplied may be divulged to any third party without the express written consent of CalAmp Corp.

Products offered may contain software which is proprietary to CalAmp Corp. The offer or supply of these products and services does not include or infer any transfer of ownership.

1.2 Modem Use

The Dataradio Vanguard 3G cellular modem is designed and intended for use in fixed, nomadic, or mobile applications. "Fixed" assumes the device is physically secured at one location and not easily moved to another location. "Mobile" assumes the modem is physically secured in a vehicle and is operated when the vehicle is moving. "Nomadic" assumes the modem is installed in a vehicle but is operated when the vehicle is stationary.

Please keep the cellular antenna of the Vanguard 3G radio modem at a safe distance from your head and body while the modem is in use (see below).

Caution:

Maintain a distance of at least 20 cm (8 inches) between the transmitter antennas and any person while in use. This modem is designed for use in applications that observe the 20 cm separation distance.

1.3 Interference Issues

Avoid possible radio frequency (RF) interference by following these guidelines:

- The use of cellular telephones or devices in aircraft is illegal. Use in aircraft may endanger operation and disrupt the cellular network. Failure to observe this restriction may result in suspension or denial of cellular services to the offender, legal action or both.
- Do not operate in the vicinity of gasoline or diesel-fuel pumps unless use has been approved and authorized.
- Do not operate in locations where medical equipment that the device could interfere with may be in use.
- Do not operate in fuel depots, chemical plants, or blasting areas unless use has been approved and authorized.
- Use care if operating in the vicinity of protected personal medical devices, i.e., hearing aids and pacemakers.

- Operation in the presence of other electronic equipment may cause interference if equipment is incorrectly protected. Follow recommendations for installation from equipment manufacturers.

1.4 Mobile Application Safety

- Do not change parameters or perform other maintenance of the Vanguard 3G modem while driving.
- Road safety is crucial. Observe National Regulations for cellular telephones and devices in vehicles.
- Avoid potential interference with vehicle electronics by correctly installing the Dataradio Vanguard 3G radio modem. CalAmp Corp recommends installation by a professional.

1.5 FCC Notification

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

2. PRODUCT OVERVIEW

2.1 Device Identification

2.1.1 Label Information

The label contains the CalAmp part number, serial number, MAC ID, FCC ID and the IMEI numbers in both Hex and decimal format.

2.2 General Description

The Dataradio Vanguard 3G Modem from CalAmp Corp is the ideal solution for a wide range of Internet Access, Corporate Network and wireless IP connectivity requirements.

The Vanguard 3G product features high-speed wireless wide-area-network access to IP networks over 3G cellular networks**.** The Vanguard 3G cellular radio modem advanced router features full Ethernet routing, DHCP Server, and NAT support. The embedded GPS makes it an ideal fit for mobile applications requiring position information and Internet connectivity. The optional built-in 802.11 WiFi tether allows you to step away from your vehicle and remain connected at all time. Alternatively, the client mode forwards all traffic via the WiFi interface instead of the cellular interface.

2.3 Features

- EVDO Rev A with data transfer rates up to 3.1 Mbps downlink, 1.8 Mbps uplink
- Embedded Linux (with support for custom applications) on ARM 9 processor
- Built-in DHCP server and NAT support
- Browser-based management
- Embedded GPS
- Local and remote configuration
- 10/100 Ethernet interface
- WiFi IEEE 802.11b/g 2.4GHz (optional)
- Built-in WiFi client and access point (AD HOC mode)
- RSSI indicator
- I/O capability
- MAC pairing

2.4 Part Number Breakdown

140-71CC-LST

140-71 = Vanguard 3G model identifier

CC = 00-99 Carrier/Technology/Cell Module Number

00 = None
01 = Verizon Wireless (CDMA - MC5727)
02 = AT&T (GSM - MC8790)
03 = Sprint (CDMA - MC5727)
04 = T-mobile (GSM - MC8790)
05 = Bell Mobility (CDMA - MC5727)
06 = Rogers Communication (GSM - MC8790)
07 = Telstra (Australia) (GSM - MC8790)
09 = Telus (CDMA - MC5727)

L = LAN Communication Options

0 = Wired LAN
1 = WiFi + Wired LAN

S = Sensor Options

1 = GPS & I/Os

T = TBD options

Reserved for future Options (0=Standard)

2.5 External Interfaces

2.5.1 Front Panel Connections

Figure 1 - Dataradio Vanguard 3G radio modem's Front Panel

Vanguard 3G radio modem front panel connections include:

GPS: SMA female, GPS antenna connector. This input requires a 3.3V, GPS antenna with an SMA connection. For best coverage, use an active GPS antenna with a gain of >25dBm.

PWR: 9-28 VDC; the mating connector is a Molex 43025-0400 4 position connector.

LAN: Input for standard or crossover Ethernet cable.

USB: Connection for USB Client port. USB is not supported at this time.

COM: Standard RS-232 port for debugging and maintenance only.

ANT: TNC female, primary antenna connection. See section 2.8 "Antenna options" for more information.

RX DIV: SMA female, receive diversity antenna. See section 2.8 "Antenna options" for more information.

WiFi: RP-SMA jack, WiFi antenna. See section 2.8 "Antenna options" for more information.

2.5.2 LEDs

There are five LEDs on the front panel of the Vanguard 3G unit. Each can display three colors: Red, Green, and Amber. The definition for each LED is as follows:

Table 1 - LED Definitions

LED	OFF	GREEN	FLASHING GREEN	RED	FLASHING RED	AMBER
WiFi	No Power Or Interface Disabled	Interface Enabled	TX/RX Activity	N/A	N/A	N/A
PWR (Power)	No Power	Power on	N/A	N/A	Power Timer Activated	Power Up, Ignition Sense OFF
STAT (Status)	No Power	Status OK	N/A	N/A	N/A	Medium or Low RSSI
NET (Network Connectivity)	No Power	Network Connected	TX/RX Activity	No Coverage	N/A	N/A
GPS	No Power	Position Fix Acquired	N/A	No Satellites in View	Fault Detected	Acquiring Satellites, no fix yet

2.5.3 Back Panel Connections

Vanguard 3G radio modem back panel connections include:

Reset: Hard reset button[1]

I/O: I/O interface connector

Figure 2 - Dataradio Vanguard 3G radio modem's Back Panel

[1] Hard reset does not default parameter configuration

2.6 RJ-45 Ethernet Port Integration Parameters

Table 2 below provides the information to purchase Ethernet cables to integrate the Vanguard 3G product into your system.

Note:

The Vanguard 3G radio modem can accept either a standard or cross over Ethernet cable.

Table 2 - Standard RJ-45 Ethernet Pin-out

Pin	Function	Color
1	TX +	White/Orange
2	TX -	Orange/White
3	RX +	White/Green
4		Blue/White
5		White/Blue
6	RX -	Green/White
7		White/Brown
8		Brown/White

2.7 Power Cable Connections

If using the provided power cable to connect to a DC supply (car battery) use the following diagrams and table to connect the unit.

Note: Both ignition sense and DC power are required to start up a Vanguard 3G unit.

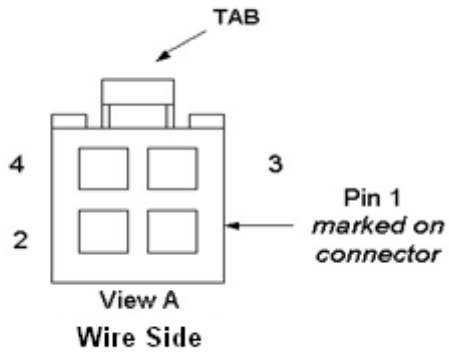


Figure 3 - Dataradio Vanguard 3G Power Cable Connections

Table 3 - Power supply connections

Pin	Color	Description
1	Red	DC Power, 9 to 28V DC
2	Blue	Ground
3	White	Ignition Sense
4	NA	No Connect

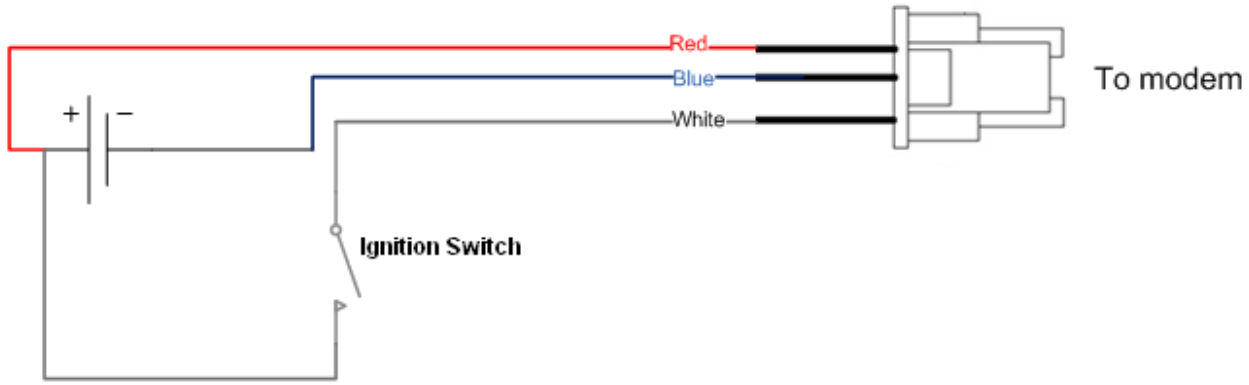


Figure 4 - Dataradio Vanguard 3G Power Cable Connections

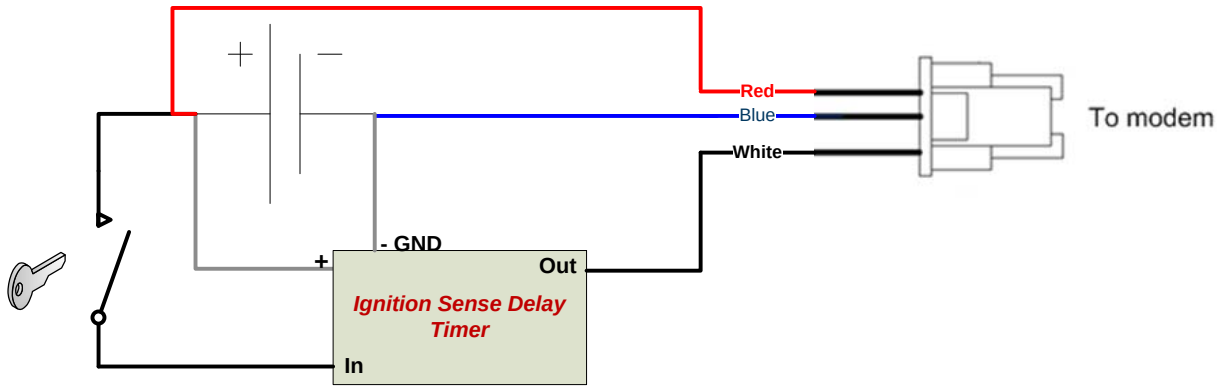


Figure 5 -Alternative Dataradio Vanguard 3G Power Cable Connections with Ignition Sense Delay Timer

2.8 Antenna Options

Antennas are available for Vanguard 3G radio modems installations from CalAmp Corp.

2.8.1 Primary Cellular Antenna

The Vanguard 3G product requires a multi-band cellular antenna for operation in the 800 MHz band, the 1900 MHz band, and the 2100 MHz band. The primary antenna connection on the Vanguard 3G unit is a TNC female connector; therefore you must purchase an antenna with a TNC male connector. Do not select a TNC antenna with "reverse polarity" or RP-Male. Mounting options and cable lengths are the user's choice and application specific.

Caution:

To comply with FCC approval for this device, do not use a cellular antenna with a gain greater than 5 dBi in the cellular (800MHz) band, or 4 dBi in the 1900MHz band.

2.8.2 RX Diversity Cellular Antenna

The Vanguard 3G radio modem RX Diversity antenna has the same requirements as the primary antenna with the exception of the connection. The RX Diversity antenna connection on the Vanguard 3G product is an SMA female connector; therefore an antenna with an SMA Male connection is required. Mounting options and cable lengths are the user's choice and application specific. For best performance, separation between the Primary and Diversity antenna should be at least 5/8 wavelength (=8 inches or 20 cm for 915 MHz).

Caution:

To comply with FCC approval for this device, do not use a cellular antenna with a gain greater than 5 dBi in the cellular (800MHz) band, or 4 dBi in the 1900MHz band.

2.8.3 GPS Antenna

The Vanguard 3G radio modem's GPS connector requires an external 3.3V GPS antenna. The GPS antenna connection on the Vanguard 3G product is a female SMA connector; therefore an antenna with an SMA male connector is required. For best coverage, use an active antenna with a gain >25dB. Mounting options and cable lengths are user's choice and application specific.

2.8.4 WiFi Antenna

The WiFi antenna connection on the Vanguard 3G product is an RP-SMA jack; therefore an antenna with an RP-SMA plug is required. Mounting options and cable lengths are user's choice and application specific.

Industry Canada RSS Notices:

This device has been designed to operate with the antennas listed below, and having a maximum gain of 5.5 dBi. Antennas not included in this list or having a gain greater than 5.5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50Ω.

Table 4 - Recommended WiFi Antenna

Manufacturer	Model Number	Antenna Type	Gain
RadioLabs Inc	2.4-mobile3	Mag Mount	5.5 dBi

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication.

2.8.5 Antenna Spacing

Referring to Figure 6 for illustration, Vanguard 3G radiomodem commonly uses four separate antennas:

- "T" - Main transceiver -

  Constraints are the limit of 20 cm and omni-directional factors
- "R" - Auxiliary receiver –

  Constraints are the receiver spacing of at least 5/8 λ (wavelength) from transceiver antenna and omni-directional requirements
- "G" - Global Positioning System (GPS)

  Constraints are TX spacing of at least 60cm/23.62 inch from all transmitting antennas and a clear view of the sky.
- "W" – WiFi antenna

  Constraints are TX spacing of at least 8 inches or 20 cm from all transmitting antennas

Note: For units utilizing diversity cellular antennas, best overall operation is achieved utilizing antennas with equal gains

WARNING: As per FCC rules, all Vanguard 3G transmitting antennas should be at a minimum of eight (8) inches (approximately 20 centimeters) from all persons.

T- Primary Antenna
R-Diversity Antenna
G-GPS Antenna
W-WiFi Antenna

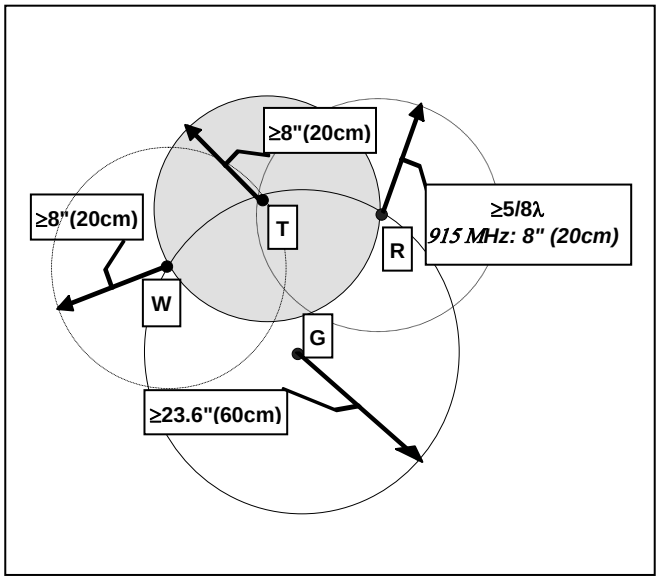


Figure 6 - Antenna Spacing[2]

For installation of ground-plane dependent antennas (main cellular and WiFi antennas), the center of the metal surface used for mounting is preferable for best omni-directional pattern. For ground-plane independent antennas (diversity and GPS antennas), installation may be close to the edges of the surface.

For vehicular installations CalAmp recommends the following antenna positions:

[2] The diagram is not drawn to scale

- Most preferred for all antennas: centerline of roof. For transmitter antenna, it is the ONLY acceptable position.
- Less preferred for receiver antenna: trunk lid, providing distance to transmitting antenna is respected whether lid is opened or closed.
- Much less preferred, but permissible for receiver antenna: left or right rear fenders, just in back of rear window
- Least preferred, but permissible for receiver antenna: left or right front fenders, ahead of windshield

3. Networking basics

3.1 General Networking Definitions

The Vanguard 3G cellular modem is based on Ethernet connectivity and follows general IP networking guidelines and terminology. Below are definitions of some basic network terminology as they pertain to the Vanguard 3G environment.

Term	Definition
Circuit Switched Data	Circuit Switched Data is the original form of a cellular connection where a radio channel is dedicated to an active phone and the connection is dropped when not in use.
DNS	Domain Name System: operates like a phone book to translate domain names (i.e., google.com) to IP addresses (70.212.19.1). The Vanguard 3G unit functions as the DNS Server in the network.
DHCP	Dynamic Host Configuration Protocol: the DHCP server assigns IP addresses, gateway and subnet masks to all clients on the network. The Vanguard 3G unit functions as a DHCP Server.
Dynamic/Static IP	A device with Dynamic IP selected may have a different IP address every time it connects to the network. A device with a Static IP will always connect with the same IP address.
Gateway	A (node) device enabling data transfer between different networks (i.e., from a private LAN to a public WAN).
LAN	Local Area Network. A private network.
NAT	Network Address Translation: A technology that allows hosts on the LAN with private IP addresses to communicate with public IP addresses on the WAN. This is an essential function of a network router.
Packet Data	Packet Data is used by 3G cellular standards. On a packet data network, users share a channel and the connection is always on.
Port	A special number present in the header of a data packet in the data transfer process. Ports are typically used to map data to a particular process running on a computer.
PPP	Point-to-point Protocol: creating a direct link between two nodes in network communication.
Private IP address	Private IP addresses are addresses that will not be routed on external networks. Any device on an internal LAN should be assigned a private IP address to avoid contention. The suggested private address ranges are Class A: 10.x.x.x Class B: 172.16.x.x through 172.31.x.x Class C: 192.168.x.x By default the Vanguard 3G radio modem uses the 192.168.1.x address range.
Provisioning	The process of activating a unit for the first time on a cellular carrier's network. You must have a service contract in place with the carrier prior to provisioning your device.
RIP	Routing Information Protocol, protocol that helps routers dynamically adapt to changes of network connections by communicating information about which networks each router can reach and how far away those networks are.
SSID	Service Set Identifier. This is a name used to identify a WiFi wireless network.
Subnet	A range of addresses assigned to a LAN. All devices connected in a Vanguard 3G network must be on the same subnet as the Vanguard 3G radio modems.
Subnet Mask	Binary string that separates the subnet portion of an IP address and the host portion.

TKIP/AES	"Temporal Key Integrity Protocol" is an encryption method used by the WiFi interface when operating in WPA mode. TKIP was designed to solve security issues in WEP (it is considered stronger then WEP). "Advanced Encryption Standard" is the encryption protocol used by the WiFi interface when it operates in WPA2 mode.
WAN	Wide Area Network, a public network. The Internet is an example of a WAN.
WEP	Wired Equivalent Privacy. This is an IEEE security protocol for wireless 802.11 networks. It is an encryption method used by the WiFi interface.
WiFi (802.11b, 802.11g)	Wireless Fidelity is an IEEE 802.11 standard for wireless LANs →802.11b is a standard for operating at 2.4 GHz frequency with data rates up to 11 Mbps →802.11g is a standard for operating at 2.4 GHz frequency with data rates up to 54 Mbps
WiFi Access Point (802.11 Ad-Hoc mode)	A Vanguard 3G unit can operate in 802.11 Ad-Hoc mode. It can communicate with other devices operating in 802.11 Ad-Hoc mode. Although it is not a true WiFi access point, we call it one because it serves as the gateway to the WAN for the other wireless devices operating in Ad-Hoc mode.
WiFi Client (802.11 Infrastructure mode)	A Vanguard 3G unit can operate in 802.11 Infrastructure mode. In this mode it is a WiFi client and will try to connect to a WiFi access point.
WLAN	Wireless Local Area Network, a private network. Refers to the network covered by the WiFi interface.
WPA/WPA2	WiFi Protected Access" is a subset of 802.11i (security mechanisms for wireless networks). "WiFi Protected Access 2" is the complete version of 802.11i.

4. GETTING STARTED

4.1 Package Contents

- Vanguard 3G cellular modem
- Quick Start Guide
- Power cable and Fuse
- User Manual and Quick Start Guide on CD
- Mounting Bracket and Screws

4.2 Setup Requirements

- Vanguard 3G cellular modem
- Computer running any operating system
- 9 to 28 Volt power supply
- Ethernet cable*
- Active cellular data account
- Cellular antenna with male TNC connector*
- Cellular Diversity Antenna (SMA Male) *
- GPS Antenna (SMA Male) *
- WiFi Antenna (RP-SMA Plug) * (if applicable)

*These accessories are available from CalAmp.

4.3 Quick Start

4.3.1 Hardware Setup

Figure 7 - Vanguard 3G radio modem setup equipment

1. Connect the primary cellular antenna to the ANT connector on the front of the unit. For units utilizing diversity, install RX Diversity antenna on SMA connector. Connect the GPS antenna to the GPS connector. For units utilizing WiFi, connect the WiFi antenna to the WiFi connector.
2. Connect an Ethernet cable from the LAN connector of the Vanguard 3G unit to the PC. If multiple PCs are being used, connect the Vanguard 3G unit to an Ethernet switch or hub connected to the PCs.
3. Connect a power supply cable to the PWR connector of the Vanguard 3G unit. Do not power the unit on yet.

4.4 Configuring Local PC

1. Verify network settings on local PC are set to automatically detect IP and DNS server. The path to network settings varies with the version of Windows you are using.

   Windows XP: Start-> Control Panel -> Network Connections

   Windows 2000: Start -> Settings -> Network and dial up connections
2. Select the appropriate network connection, typically the Local Area Connection -> right click on the connection and select "Properties"
3. Select "Internet Protocol (TCP/IP) properties.

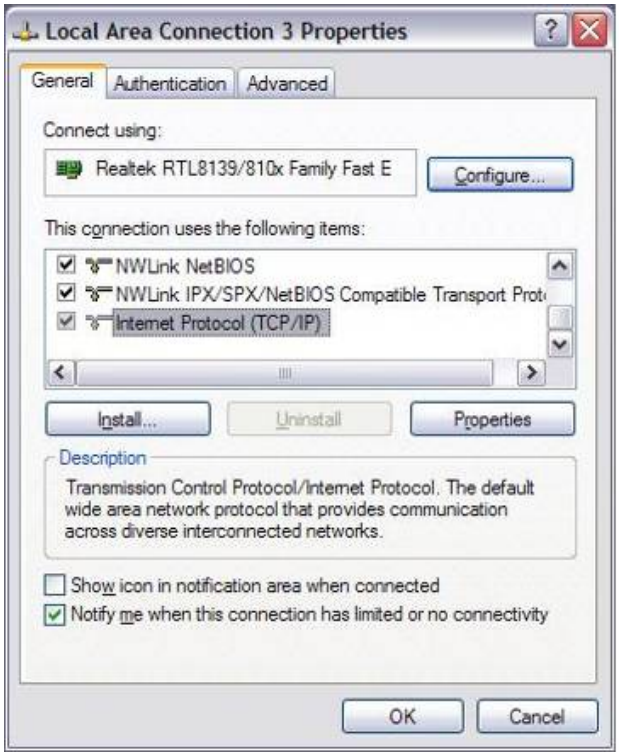


Figure 8 - Local Area Connection Properties (Windows XP)

4. Verify that "Obtain an IP address automatically" and "Obtain DNS Server address automatically" are selected.

Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 9 - Internet Protocol (TCP/IP Properties)

4.5 Vanguard 3G Radio Modem Setup

1. Power on the Vanguard 3G radio modem with 9-28VDC 15-Watt supply.
2. In an Internet browser, enter http://192.168.1.50. This will bring up the Vanguard 3G product login page (Note: It may take 30 seconds from initial power-up for the homepage to be available.)
3. Login to the device

   Default Login values

   User logon: *admin*

   password: *password*
4. This brings up the Vanguard 3G product homepage. You can view status and configuration parameters from this screen. The configuration options are further explained later in this document.

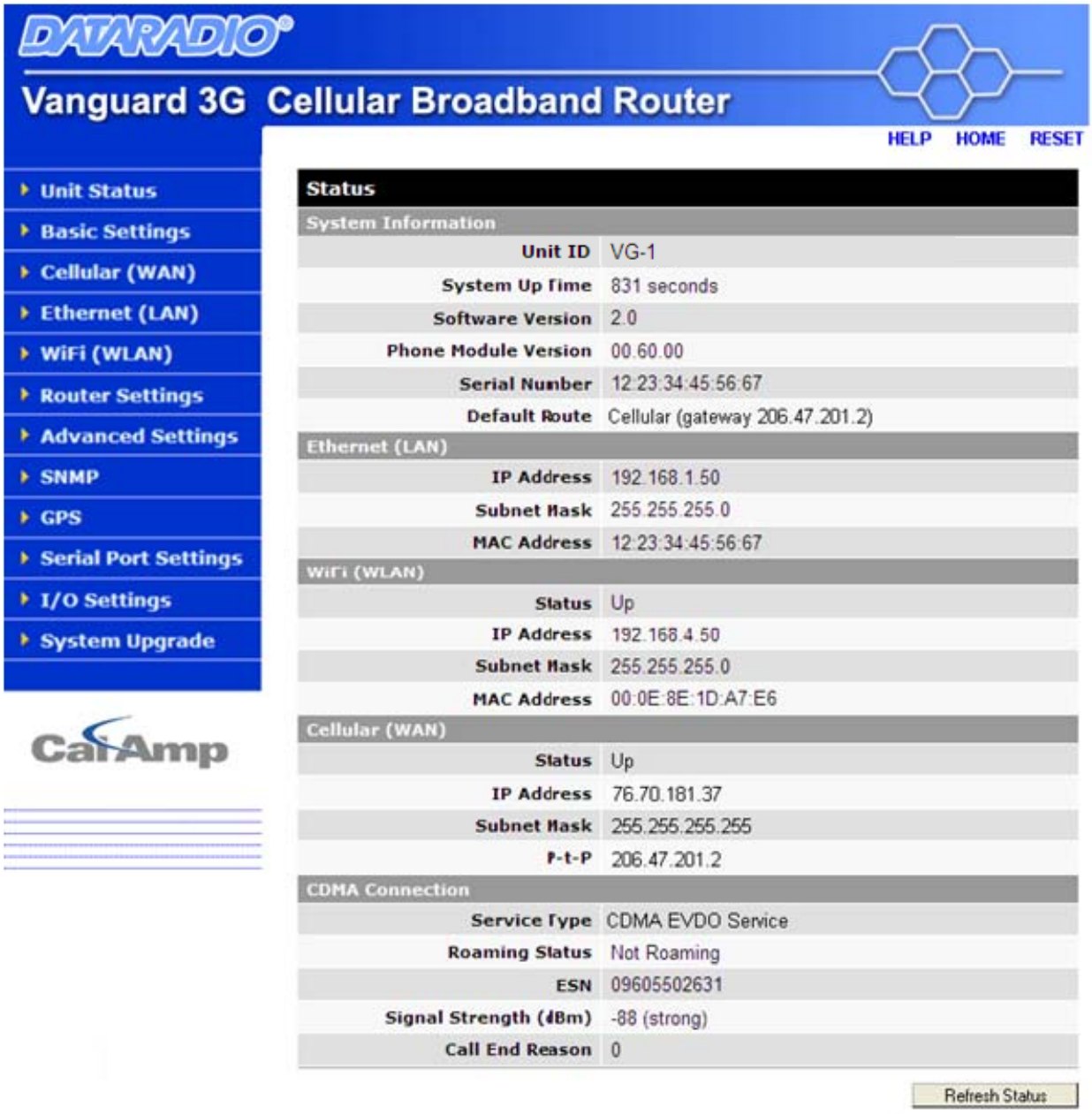


Figure 10 - Vanguard 3G radio modem Homepage

Provisioning the Vanguard 3G Radio Modem

IMPORTANT NOTE:

The Vanguard 3G cellular radio modem requires an active cellular data service contract for provisioning. Verify that your cellular service contract is a data service contract with packet data NOT circuit switched technology. If you do not have an active data contract, contact your service provider.

Note:

The Vanguard 3G radio modems are carrier specific. You must activate your unit with the carrier specified when the product was ordered. The unit must be activated in the carrier's home area.

Depending on your carrier, the Vanguard 3G radio modem can be activated manually (see Figure 11) or using OTASP (Over-The-Air Service Programming) or IOTA (Internet Over-The-Air) (see Figure 12). In either case, the carrier will require you to provide them with the **ESN** (electronic serial number) that is assigned to the cellular modem at the factory. You can see your ESN by selecting the Cellular (WAN) page→ "Status" tab or on the label on the bottom of your Vanguard 3G unit.

For manual activation, you will also need the following specific information from the provider:

a) Mobile Directory number (**MDN**)
b) Mobile Station ID (MSID or **MIN**). In many cases, this number will be the same as the MDN.
c) Unlock Code (if required)-provided by most carriers when activating a contract.

4.5.1 Provisioning the Vanguard 3G Radio Modem with Verizon Wireless

1. On the left side of the screen, select the Cellular (WAN) page. Select "Activation" tab .
2. In the "OTASP/IOTA Activation" portion of the screen (Figure 12), select "OTASP". Click Submit.

   Note: "Command (OTASP Only)" is a carrier specific command used for OTASP. The default value is *22899 (Verizon OTA command).

3. After a few moments you will receive a message saying the OTA was successful. Once OTA is complete, the unit will reset.
4. Once the module is activated, browse to an Internet web page to confirm connectivity.

   Note: Should you experience problems connecting to the web page, reset the Vanguard 3G unit by clicking RESET on the top right of the screen and try reconnecting to the web page.

4.5.2 Provisioning the Vanguard 3G Radio Modem with Sprint

1. On the left side of the screen, select the Cellular (WAN) page. Select "Activation" tab.
2. In the "OTASP/IOTA Activation" portion of the screen (Figure 12), select "IOTA". Click Submit.
3. After a few moments you will receive a message saying the OTA was successful. Once OTA is complete, the unit will reset.

4. Once the module is activated, browse to an Internet web page to confirm connectivity.

   Note: Should you experience problems connecting to the web page, reset the Vanguard 3G unit by clicking RESET on the top right of the screen and try reconnecting to the web page.

4.5.3 Provisioning the Vanguard 3G Radio Modem with Bell Mobility

1. On the left side of the screen, select the Cellular (WAN) page. Select "Activation" tab.
2. In the "Manual-Entry Activation" portion of the screen (Figure 11), enter MDN, MIN, and Unlock code as provided by Bell Mobility. Click Submit. Provisioning will occur automatically after the parameters are loaded.
3. After a few moments you will receive a message saying the activation was successful. Once activation is complete, the unit will reset.
4. Once the module is activated, browse to an Internet web page to confirm connectivity.

   Note: Should you experience problems connecting to the web page, reset the Vanguard 3G unit by clicking RESET on the top right of the screen and try reconnecting to the web page.

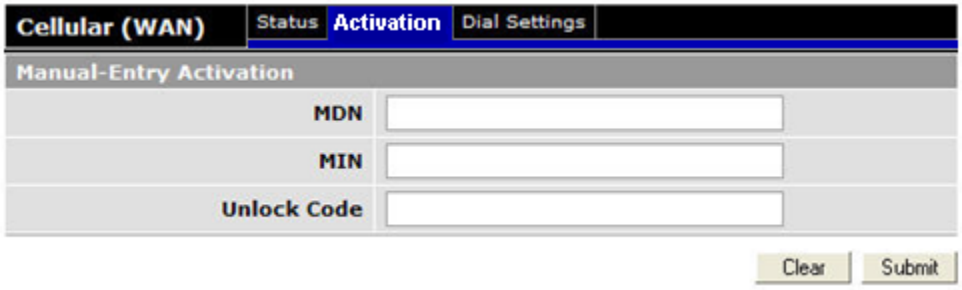


Figure 11 - Vanguard 3G product Cellular (WAN) page Manual-Entry Activation

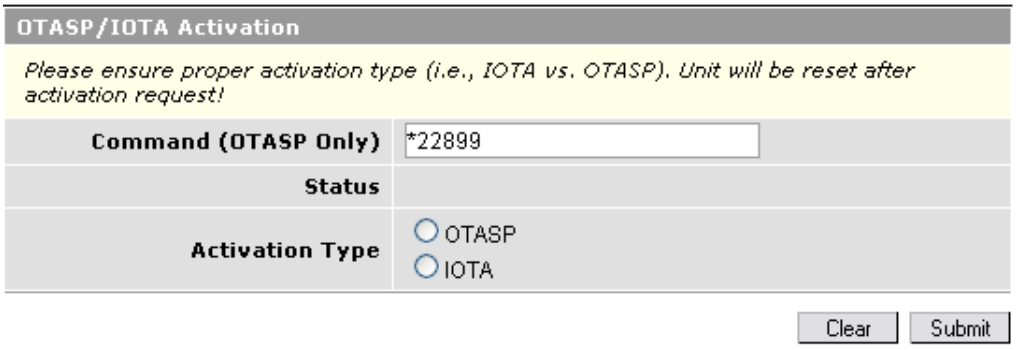


Figure 12 - Vanguard 3G product Cellular (WAN) page OTASP/IOTA Activation

Note: For more details on provisioning refer to section 5.3.3 and section 6.

5. Vanguard 3G Configuration

This section explains status information and configuration options available on all HTML pages.

5.1 General Instructions

The following instructions are common to all HTML pages

The Help, Home and Reset links are located at the top right of all HTML pages.

Help: Select this link on any of the devices configuration pages to bring up the help text for that screen.

Home: Select this link to return to the home page of the modem.

Reset: Select this link to command the unit to reboot. This process will take about 40 seconds. The software will ask you to confirm this command prior to re-booting.

Save: Most changes to a configuration parameter require the user to click save before the change will take effect.

Clear/Cancel: Most configuration menus also have a "Clear/Cancel" option. Selecting this button will restore all fields in a section to their last saved value. Note: This does not return them to their factory defaults.

5.2 Home Page Parameters

The Vanguard 3G cellular modem home page lists the unit's primary operating parameters and status. Configuration changes cannot be made from this page.

Status	
System Information	
Unit ID	VG-1
System Up Time	4091 seconds
Software Version	0.0
Phone Module Version	00.60.00
Serial Number	12:23:34:45:56:67
Default Route	Cellular (gateway:206.47.201.2)
Ethernet (LAN)	
IP Address	192.168.1.50
Subnet Mask	255.255.255.0
MAC Address	12:23:34:45:56:67
WiFi (WLAN)	
Status	Up
IP Address	192.168.2.50
Subnet Mask	255.255.255.0
MAC Address	00:0E:8E:14:17:10
Cellular (WAN)	
Status	Up
IP Address	76.70.181.37
Subnet Mask	255.255.255.255
P-t-P	206.47.201.2
CDMA Connection	
Service Type	CDMA EVDO Service
Roaming Status	Not Roaming
ESN	09605144974
Signal Strength (dBm)	-76 (strong)
Call End Reason	0

Figure 13 - Vanguard 3G Radio Modem Home Page

5.2.1 Home Page Parameter Descriptions

System Information

Unit ID: Unit identification number (configured under Basic Settings).

System Up Time: System Up Time displays a counter that starts when the unit is powered on and resets when the unit is powered down or hardware reset.

Note: This counter does NOT indicate how long the WAN connection has been up.

Software Version: This reflects the version of application software loaded on the unit.

Phone Module Version: This is the version of the cellular module installed in the device. This may be required by tech support but is not required for any user applications.

Serial Number: This is assigned at the factory. This may be required by tech support but is not required for any user applications.

Default Route: Network route used by the Vanguard 3G cellular radio modem when no other known route exists for a given IP packet's destination address.

The default route points to the Cellular interface when WAN is up. The only exception to this rule is if the WiFi interface is configured in wireless client mode and is connected to a WiFi access point (WiFi Status=Up). In that case, the default route will point to the WiFi interface.

Note: When the connection to the WiFi access point is down the default route is set back to the Cellular interface.

Ethernet (LAN)

IP Address: IP Lists the LAN IP address of the Vanguard 3G unit. This IP becomes the gateway and DNS server for all PCs and devices connected on the LAN. This value is configured on the LAN Settings Page.

Subnet Mask: The Subnet mask is used in conjunction with the network address to partition the IP address into the network (subnet) portion and the host portion. In most cases, this value will be automatically set by the software based on the class of IP address used for the Ethernet IP. This value can be modified on the LAN Settings page.

MAC Address: Media Access Control Address, this is configured at the factory and cannot be changed by the user.

WiFi (WLAN)

Status: Indicates if the WiFi interface is "UP" or "DOWN"

IP Address: IP address assigned to the WiFi interface of this device. When the WiFi interface is set to operate in WiFi Client mode, the WiFi Access Point must have a DHCP server running to assign an IP address to its WiFi clients.

Subnet Mask: Subnet Mask assigned to the WiFi interface of this device.

MAC Address: Media Access Control Address of the WiFi interface.

Cellular (WAN)

Status: indicates if the device has an established connection to the WAN. Status is UP or DOWN

IP Address: WAN IP address of the Vanguard 3G unit. Remote access for the device requires entering this address into a browser. The PPP IP Address is assigned by the cellular carrier and will be dynamic unless a static address is specifically requested

Warning: Be aware of the dynamic nature of the WAN IP Address as it can affect related applications.

Subnet Mask: This subnet mask is assigned by the carrier and is not configurable by the user.

P-t-P: WAN IP address of the network access point of the cellular carrier

CDMA Connection

Service Type: Service Type indicates the type of service connection. The Vanguard 3G radio modem will automatically connect to the most advanced service available and will fall back to other networks (such as 1xRTT) when EV-DO Rev A is not available.

Roaming Status: Roaming Status indicates the unit roaming status. Status is ROAMING or NOT ROAMING

ESN: Electronic Serial Number is assigned to the cellular modem at the factory. This number must be provided to the carrier to activate the module.

Signal Strength: Receive Signal Strength Indication indicates the strength of the network signal with both a numerical value and a good/medium/poor message.

Call End Reason: Code indicating the reason for a call ending.

5.3 Cellular WAN Parameters

This page contains the provisioning information and the carrier activation settings. For more information on the procedure for carrier activation, see section 4.6 "Provisioning the Vanguard 3G Radio Modem".

5.3.1 Status

WAN Status information is available (Figure 14).

ESN: Electronic Serial Number is assigned to the cellular modem at the factory. This number must be provided to the carrier to activate the module.

MDN/MTN: The Mobile Directory Number; assigned by the carrier when the module is activated

MIN/MSI: Mobile Identification Number, in most cases, this is the same as the MDN.

PRL: Preferred Roaming List; a database that declares the priority of other carriers while roaming. This file should be updated periodically to ensure proper connectivity while roaming. The PRL file can be updated by performing an OTA or IOTA operation (see provisioning section)

SID: System ID, this is status only and is assigned by the carrier when connecting to the network

NID: Network ID; this is status only and is assigned by the carrier when connecting to the network.

Channel: Status only, indicates the channel assigned by the carrier when connecting to the network

Frequency: Status only, indicates the frequency band on which the unit is communicating. If the unit is being used in North America, it will indicate either 800 MHz or 1900 MHz

Signal Strength: Receive Signal Strength Indication indicates the strength of the network signal with both a numerical value and a good/medium/poor message

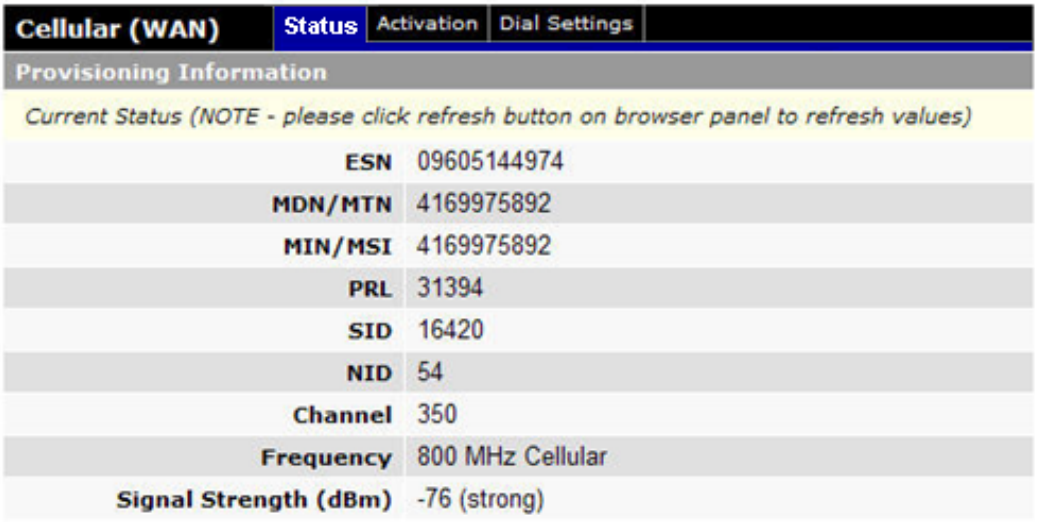


Figure 14 - Vanguard 3G Radio Modem Cellular (WAN) Status Page

5.3.2 Activation

Provisioning information (see section 4.6 "Provisioning the Vanguard 3G Radio Modem".)

5.3.3 Dial Settings

The Dial Settings page allows the user to Disable auto-connect. This page also contains information on the reconnect timers in the note under the "Connect" selection. These reconnect timers are defined per carriers certification requirements; they cannot be changed.

By default, the auto-connect feature (labeled "Connect") is enabled. When this feature is enabled, the Vanguard 3G radio modem will automatically connect to the network on power up. If the auto-connect is disabled, you must re-enable the auto-connect, then cycle power or perform a hardware reset to connect to the network. If you want to keep the auto-connection function disabled, you will have to disable it before powering down again.

This page also contains dial number, user and password information. This information should only be entered if required by your carrier.

Note: When establishing a connection to a provider's network, there are two ways your Vanguard 3G modem can authenticate and receive its IP address: Mobile IP (MIP) or Simple IP (SIP). Most providers can allow a MIP-only account, a SIP-only account, or a MIP with SIP fallback account.

On a Mobile IP network, the Vanguard 3G will maintain the same IP address over any geographical region, while on the SIP network IP addresses may change depending on the geographical location. If you are using a SIP account, the carrier must provide you with a username and password that should be entered under Cellular (WAN)→Dial Settings. If the entries are left blank, the Vanguard 3G modem will consider itself working with a MIP account.

Note:

Most users will not enter a dial number. This is required for older dial up cellular standards. It is not used for 3G standards. Unless it is specifically required for your application, do not enter any information in this field.

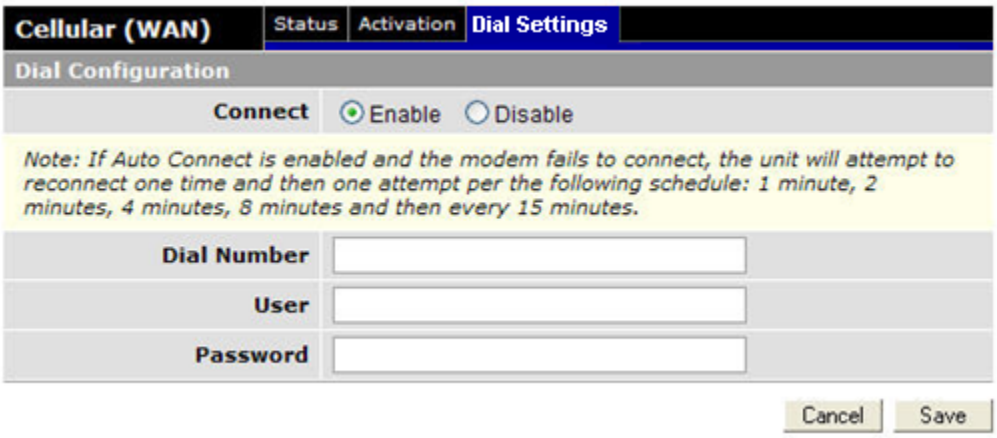

Cellular (WAN)
Status
Activation
Dial Settings
Dial Configuration
Connect
Enable
Disable
Note: If Auto Connect is enabled and the modem fails to connect, the unit will attempt to reconnect one time and then one attempt per the following schedule: 1 minute, 2 minutes, 4 minutes, 8 minutes and then every 15 minutes.
Dial Number
User
Password
Cancel
Save

Figure 15 - Vanguard 3G Radio Modem Cellular (WAN) - Dial Settings

5.4 LAN Settings

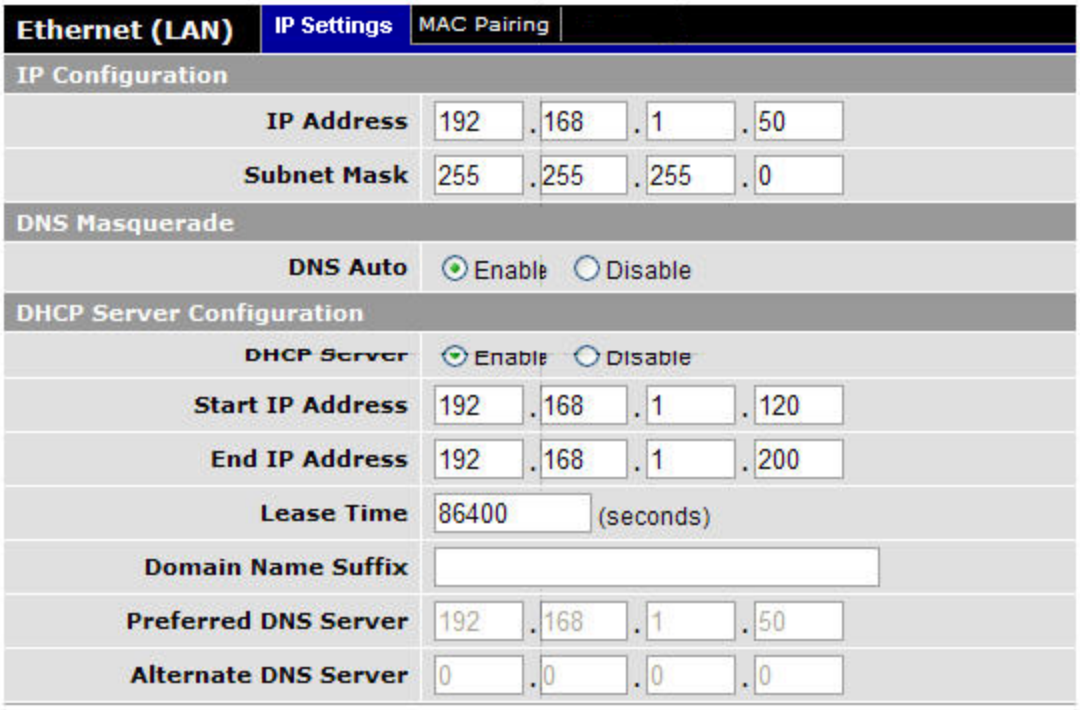


Figure 16 - LAN Settings Page

The LAN Settings page contains the basic configuration information required to customize your LAN with the Vanguard 3G radio modem as the network connection point. User configuration will primarily occur on this page.

5.4.1 IP Settings

5.4.1.1 IP Configuration

Ethernet IP address: LAN IP of the VANGUARD 3G radio modem. This address is entered into a browser on a local PC when logging into the Vanguard 3G radio modem home page. To decrease the chances of unwanted access, this value should be changed from its default prior to use.

IMPORTAT NOTE:

Changing this value will cause you to lose connection to the Vanguard 3G unit. Enter the new address in the browser to reconnect. If you forget an address or make a mistake entering the new value, it may be difficult to reconnect to the device.

Ethernet Subnet Mask: The Subnet mask is used in conjunction with the Ethernet IP address to partition the address into the network (subnet) portion and the host portion. This value will be entered automatically by the software based on the class of IP address entered. It is not be necessary to change the default value once the Ethernet IP is entered.

5.4.1.2 DNS Masquerade

See the definition for DNS in Network Basics in section 3.1 above.

DNS Auto: The command enables/disables the Vanguard 3G DNS server. Except in special cases, this should always be enabled.

5.4.1.3 DHCP Server Configuration

DHCP Server: (Dynamic Host Configuration Protocol) A protocol used by client devices that are connected to the LAN port of this device to automatically obtain an IP address assigned by this server/router. Selecting Enable will configure this device to assign IP addresses to client devices taken from a pool specified by the values entered in DHCP start range and DHCP end range. If DHCP is disabled, the information must be entered manually on all PCs.

DHCP Start IP Address/End IP Address: Sets the range of IP addresses assigned to the PCs. The user can limit the number of devices allowed on the network by limiting the range of IP addresses.

IMPORTANT NOTE:

The addresses in this range must be on the same subnet as the Ethernet IP

IMPORTANT NOTE:

The Ethernet IP should not be in the DHCP range.

DHCP Lease Time: Number that dictates the length of time a device on the LAN can hold an IP address. In most cases, this should be set to the maximum (default value) of 86400. If this value is set too low, it can cause network connectivity problems.

Domain Name Suffix: The DNS suffix to be assigned by the DHCP server.

Preferred DNS Server: IP address of the preferred DNS server.

Alternate DNS Server: IP address of the alternate DNS server.

5.4.1.4 Disabling DHCP server

When DHCP server is enabled, any PC with physical access to the Vanguard 3G Ethernet port will be assigned an IP address and have access to browse the Internet. This may cause security problems. Disabling DHCP server will allow the user to control which PCs have the ability to connect through the Vanguard 3G radio modem. *If changes are made to the network settings, be sure to keep a record of the changes for future use.*

- Disabling DHCP server is performed on the LAN settings page. Under the DHCP section, select Disable, then click Save.

IMPORTANT NOTE:

This also disables DNS Masquerading. Disabling DHCP server will remove all values in the DHCP and DNS sections. Record all values in these fields prior to disabling in case you are required to go back to the original configuration.

- To improve security, change the Ethernet IP of the Vanguard 3G unit from the default setting.

IMPORTANT NOTE:

If the DHCP server is disabled, and you do not have a record of the Ethernet IP, you will not be able to login to the Vanguard 3G home page.

On the network setting page of each PC set the following

– IP address: Set a unique address on the same subnet as the Vanguard 3G radio modem

– Subnet Mask: Set to the same value as the Vanguard's Ethernet Subnet Mask field

– Default Gateway: Ethernet IP of the Vanguard 3G radio modem

– Preferred DNS: Ethernet IP of Vanguard 3G radio modem

When these settings are complete, the PC will have network access.

5.4.1.5 Static IP Setup

If your network requires each PC to have a statically set LAN IP addresses, follow the previous procedure for all PCs on the network. If the network requires a mix of static and dynamically assigned IP addresses, assign static IPs outside the DHCP address range for PCs that require static IP addresses and allow the Vanguard 3G radio modem DHCP to assign the remaining PC IP addresses.

5.4.2 MAC Pairing

For enhanced security, the user can pair a Host PC to the Vanguard 3G unit by specifying the Host's Ethernet MAC address.

This ensures that only this particular host PC can send and receive traffic to and from the WAN interface of the Vanguard 3G unit. Connections that do not have the matching source MAC address will be blocked.

Note: Access to the Vanguard 3G unit itself is always available regardless of the Ethernet MAC address and will not be blocked.

Status:

Vanguard 3G is unpaired: No host PC is paired with the Vanguard 3G unit. Any host PC on the LAN can send and receive traffic to and from the WAN interface

Vanguard 3G is paired: A host PC is paired with the Vanguard 3G unit. Only the paired host PC can pass data to and from the WAN interface.

Current Address: The current Ethernet MAC address of the paired host PC.

Note: to change the paired host PC, the user must specify the current Ethernet MAC address of the last paired host PC.

E.G. 00:12:34:56:78:AB

New Address: Ethernet MAC address of the host PC to be paired with the Vanguard 3G unit.

Confirm New Address: Confirm the new Ethernet MAC address of the host PC to be paired with the Vanguard 3G unit.

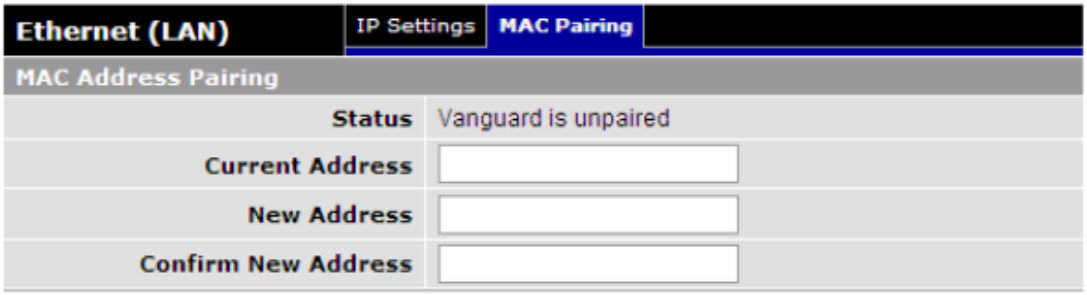


Figure 17 - MAC Pairing

5.5 WiFi (WLAN)

A Vanguard 3G unit can operate in an access point mode (Ad-Hoc) and in a client mode.

In access point mode, the Vanguard 3G radio modem offers wireless tether. It forwards local WiFi traffic to application servers over the cellular network and works in parallel with Ethernet connection, providing for simultaneous WiFi and Ethernet connections (see Figure 18A).

In client mode the Vanguard 3G unit can automatically switch between cellular and WiFi connections providing for seamless handover when coupled with modern applications (see Figure 18B).

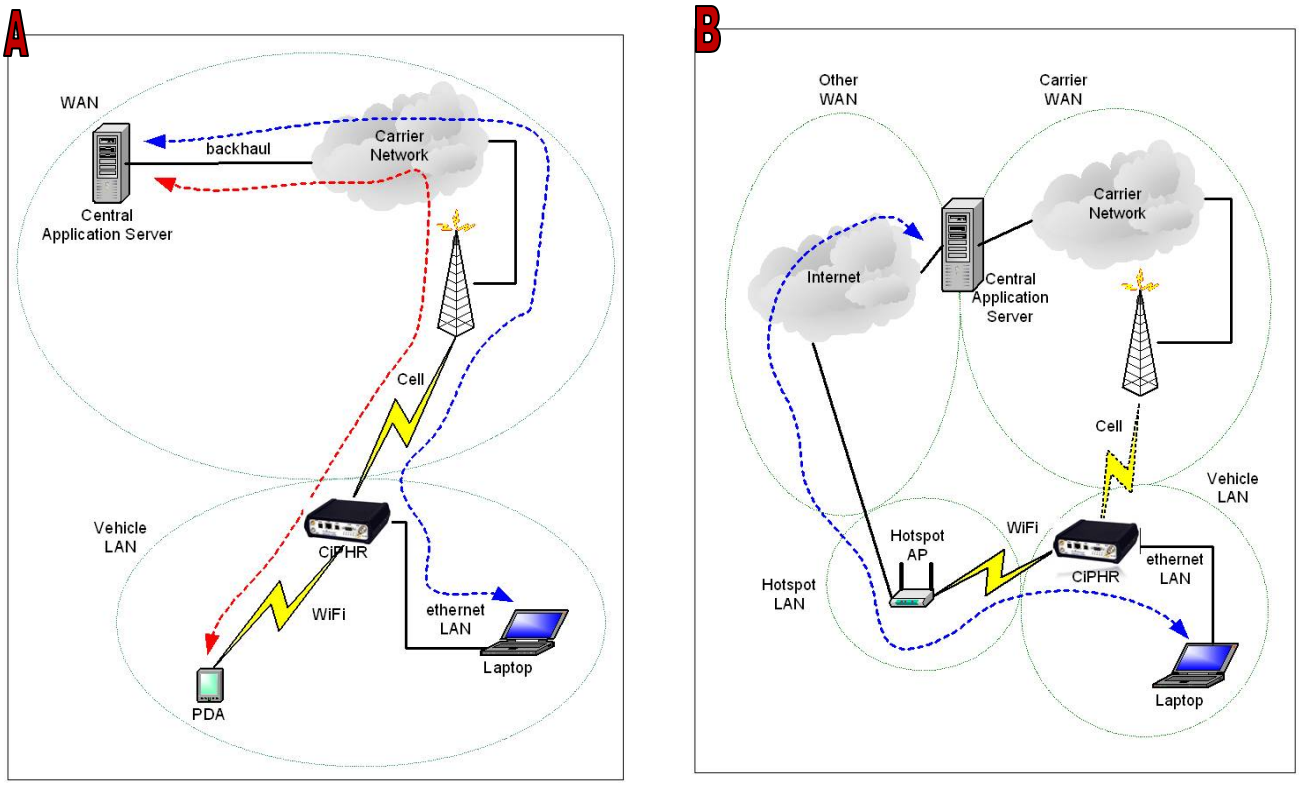


Figure 18 - Vanguard 3G WiFi Modes: Access Point (A); Client Mode (B)

5.5.1 WiFi (WLAN)→Main

WiFi settings provide user configuration for optimal WiFi interface operation.

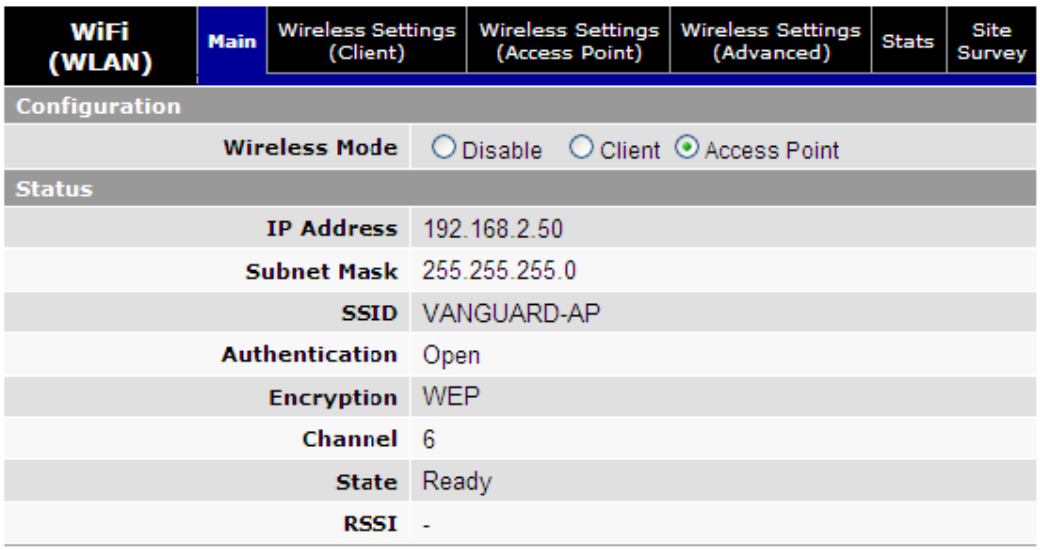


Figure 19 - WiFi (WLAN) →Status

Configuration

Wireless Mode:

Disable: The WiFi interface is disabled

Client: The WiFi interface operates in Client mode

Access Point: The WiFi interface operates in Access Point mode (Ad-Hoc)

Status

IP Address: IP address assigned to the WiFi interface

Subnet Mask: IP Subnet Mask assigned to the WiFi interface

SSID: Name of the wireless local area network

Authentication: Authentication method currently used (Example: Open, Shared, WPANONE, WPA-PSK, WPA2-PSK)

Encryption: Encryption method currently used

Channel: Channel currently used (Auto or 1-11)

State: Current state of the WiFi interface (Disabled, Ready if in Access point Mode, or Not Connected, Scanning, and Connected if in Client Mode)

RSSI: Received Signal Strength Indicator (displayed in Client Mode only)

5.5.2 WiFi (WLAN)→Wireless Settings (Client)

The user can configure up to 20 access points.

Note: All access points must run a DHCP server.

In wireless client mode, the Vanguard 3G unit will try to connect to the Access Point with the strongest signal on the list. When the Vanguard 3G unit connects to an access point, it starts a DHCP client service. The DHCP server running on the access point must provide an IP address, netmask, and gateway to the Vanguard 3G unit. When the WiFi client is connected to a WiFi access point, the default route is set to point to the gateway address obtained by the DHCP client.

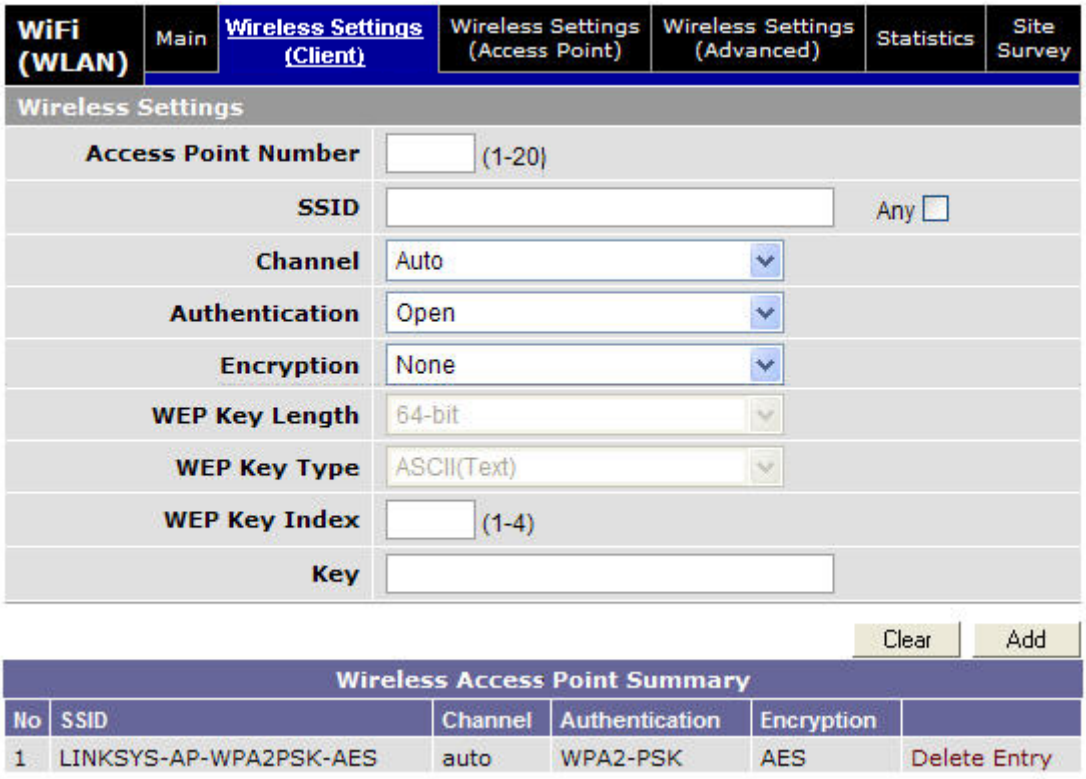


Figure 20 - WiFi (WLAN)→Wireless Settings (Client)

Wireless Settings

Access Point Number: Access point number

SSID: Service Set Identifier. This is the name of the wireless local area network.

Channel: Channel number to use (Auto or 1-11)

Authentication: Authentication method to be used (Example: Open, Shared, WPANONE, WPA-PSK, WPA2-PSK)

Encryption: None, WEP, TKIP, or AES

WEP Key Length: the bit key length

WEP Key Type: type of WEP security

WEP Key Index: 1-4

Key: The encryption key

Note: *For a 64-bit key, keys are 5 character strings long if WEP Key Type is set to ASCII and 10 hexadecimal digits long if WEP Key Type is set to HEX.*

For a 128-bit key, keys are 13 character strings long if WEP Key Type is set to ASCII and 26 hexadecimal digits long if WEP Key Type is set to HEX.

The following table shows examples of encryption keys depending on encryption type chosen.

Table 5 - Encryption Keys Examples

Encryption Type	Description	Key (Example)
WEP Encryption		
64-bit/ASCII	5 character string	CrYpT
64-bit/Hexadecimal	10 hexadecimal digits	mYEncryptKeY4
128-bit/ASCII	13 character string	LongHello1234
128-bit/Hexadecimal	26 hexadecimal digits	123456789012345678 90ABCDEF
TKIP Encryption		
Any Key	A string of 8 to 63 characters	AbCdEfGhIjKlMnOp
AES Encryption		
Any Key	A string of 8 to 63 characters	AbCdEfGhIjKlMnOp

5.5.3 WiFi (WLAN)→Wireless Settings (Access Point)

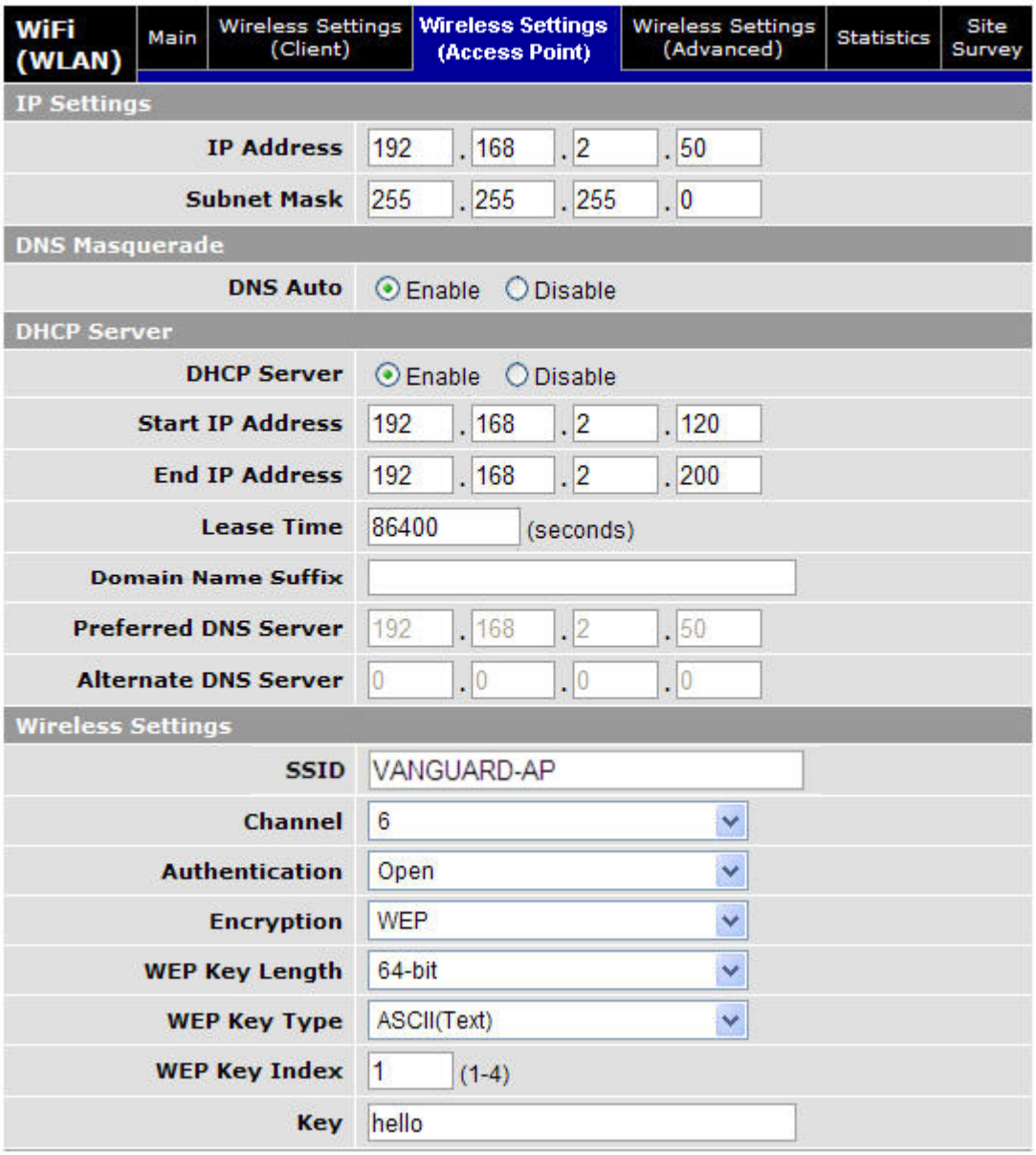

WiFi (WLAN)
Main
Wireless Settings (Client)
Wireless Settings (Access Point)
Wireless Settings (Advanced)
Statistics
Site Survey
IP Settings
IP Address 192 . 168 . 2 . 50
Subnet Mask 255 . 255 . 255 . 0
DNS Masquerade
DNS Auto Enable Disable
DHCP Server
DHCP Server Enable Disable
Start IP Address 192 . 168 . 2 . 120
End IP Address 192 . 168 . 2 . 200
Lease Time 86400 (seconds)
Domain Name Suffix
Preferred DNS Server 192 . 168 . 2 . 50
Alternate DNS Server 0 . 0 . 0 . 0
Wireless Settings
SSID VANGUARD-AP
Channel 6
Authentication Open
Encryption WEP
WEP Key Length 64-bit
WEP Key Type ASCII(Text)
WEP Key Index 1 (1-4)
Key hello

Figure 21 - WiFi (WLAN)→ Wireless Settings (Access Point)

IP Settings

IP Address: IP address of the WiFi interface
Subnet Mask: The network mask of the WiFi interface

DNS Masquerade

DNS Auto: Enables or disables the Vanguard 3G DNS server on the WiFi interface

DHCP Server

DHCP Server: Enables or disables DHCP server on the WiFi interface

Start IP Address: Starting IP address (defines the pool of addresses allocated for DHCP purpose)

End IP Address: Ending IP address (defines the pool of addresses allocated for DHCP purpose)

Lease Time: The period over which the IP address allocated to a DHCP client is referred to as a "lease". Lease duration is the amount entered in seconds.

Domain Name Suffix: DNS suffix to be assigned by the DHCP server

Preferred DNS Suffix: IP address of the preferred DNS server

Alternate DNS Suffix: IP address of the alternate DNS server

Wireless Settings

SSID: Service Set Identifier. This is the name of the wireless local area network.

Channel: Channel number to use (Auto or 1-11)

Authentication: Authentication method to be used (Example: Open, Shared, WPANONE, WPA-PSK, WPA2-PSK)

Encryption: Encryption method currently used

WEP Key Length: the bit key length

WEP Key Type: type of WEP security

WEP Key Index: 1-4

Key: The encryption key

Note: *For a 64-bit key, keys are 5 character strings long if WEP Key Type is set to ASCII and 10 hexadecimal digits long if WEP Key Type is set to HEX.*

For a 128-bit key, keys are 13 character strings long if WEP Key Type is set to ASCII and 26 hexadecimal digits long if WEP Key Type is set to HEX.

Refer to Table 5 for examples of encryption keys depending on encryption type chosen.

5.5.4 WiFi (WLAN)→Wireless Settings (Advanced)

Not supported in the current version.

5.5.5 WiFi (WLAN)→Statistics

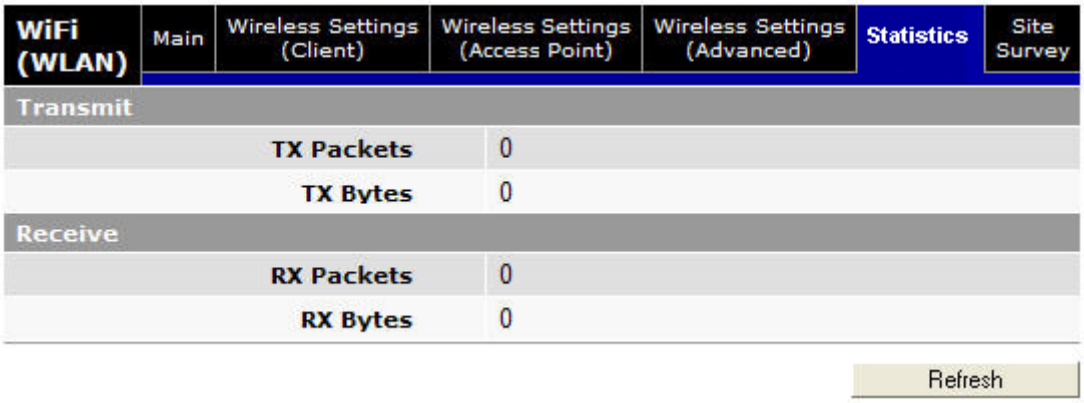


Figure 22 - WiFi (WLAN)→ Wireless Settings (Statistics)

Transmit

TX Packets: Number of packets sent by the Vanguard 3G unit over the WiFi interface
TX Bytes: Number of bytes sent by the Vanguard 3G unit over the WiFi interface

Receive

RX Packets: Number of packets received by the Vanguard 3G unit over the WiFi interface
RX Bytes: Number of bytes received by the Vanguard 3G unit over the WiFi interface

5.5.6 WiFi (WLAN)→Site Survey

Figure 23 - WiFi (WLAN)→ Wireless Settings (Site Survey)

When the WiFi interface of the Vanguard 3G unit operates in Client mode, this screen shows the WiFi Access Point detected during last wireless scan.

The list is empty when the Vanguard 3G unit is operating in Access Point mode.

5.6 Router Settings

Router settings provide advanced user configuration for large network setups.

5.6.1 RIP Settings

Not supported in the current version

5.6.2 Static Routes

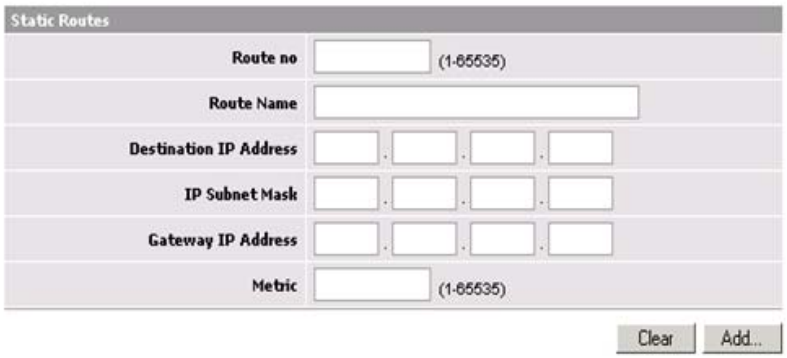


Figure 24 - Static Routes Screen

The Vanguard 3G unit will automatically set up routing to all devices on the same subnet. In some cases however, the Vanguard 3G unit may need to communicate with a previously existing subnet other than its own. This route cannot be automatically generated; it must be manually entered as a static route by the user. The static route gives the Vanguard 3G radio modem its "next hop" instructions.

Route no: A generic number assigned to the route. Multiple static routes can be assigned as long as they have distinct route numbers.

Route Name: Nickname assigned to the route by the user.

Destination IP Address: This is the destination IP address that is delivered to the Vanguard 3G radio modem. Since this IP address will not be on the same subnet, the Vanguard 3G radio modem will not have a defined route, and will not know where to send it by default. Setting up the static route will inform the Vanguard 3G radio modem where to send the data.

IP Subnet Mask: The Subnet mask is determined by the subnet of the destination address

Gateway IP: This is the address that the data packet will be routed to.

Note:

The device at this address must be a router that is either on the same subnet as the Destination IP or one with its own statically setup route to the destination address. If this is not the case, the packet data will be dropped.

Metric: This sets the priority of the routes compared to other static routed defined. The lower the number, the higher priority the route.

Click on "Add" when all necessary information has been entered. The route will be shown on the bottom of the screen (under Static Routing Table). Additional routes can be added provided they have a unique Route no, name and metric. Routes can be deleted by clicking the Delete Entry option of the desired entry.

Note:

Routing table (found under "Table" tab) shows all routes, while Static Table (found under "Settings" tab) shows manually entered routes only.

5.6.3 Routing Table

The table in Figure 25 shows a list of all routes (static and dynamic).

Router Settings | Settings | Table

Routing Table

Dest IP	Gateway IP	Subnet Mask	Flags	Metric	Ref	Use	Iface
206.47.201.2	*	255.255.255.255	UH	0	0	0	ppp0
192.168.2.0	*	255.255.255.0	U	0	0	0	wlan0
192.168.1.0	*	255.255.255.0	U	0	0	0	eth0
default	*	0.0.0.0	U	0	0	0	ppp0

Figure 25 - Routing Table

5.7 Advanced Settings

5.7.1 Advanced Settings -NAT and Port Forwarding (Mapping)

When NAT is enabled, the LAN (Ethernet) is considered private, the WAN is considered public. Any IP packets leaving the Vanguard 3G unit through the WAN interface will have its source IP address changed to that of the WAN interface.

Any data transfer must be initiated from the private side of the network toward the public side.

Port Forwarding is used to provide remote access to third party devices on the LAN, such as Web Cameras or printers. Port Forwarding routes incoming requests from the WAN, with a specific port to a local device with a static IP.

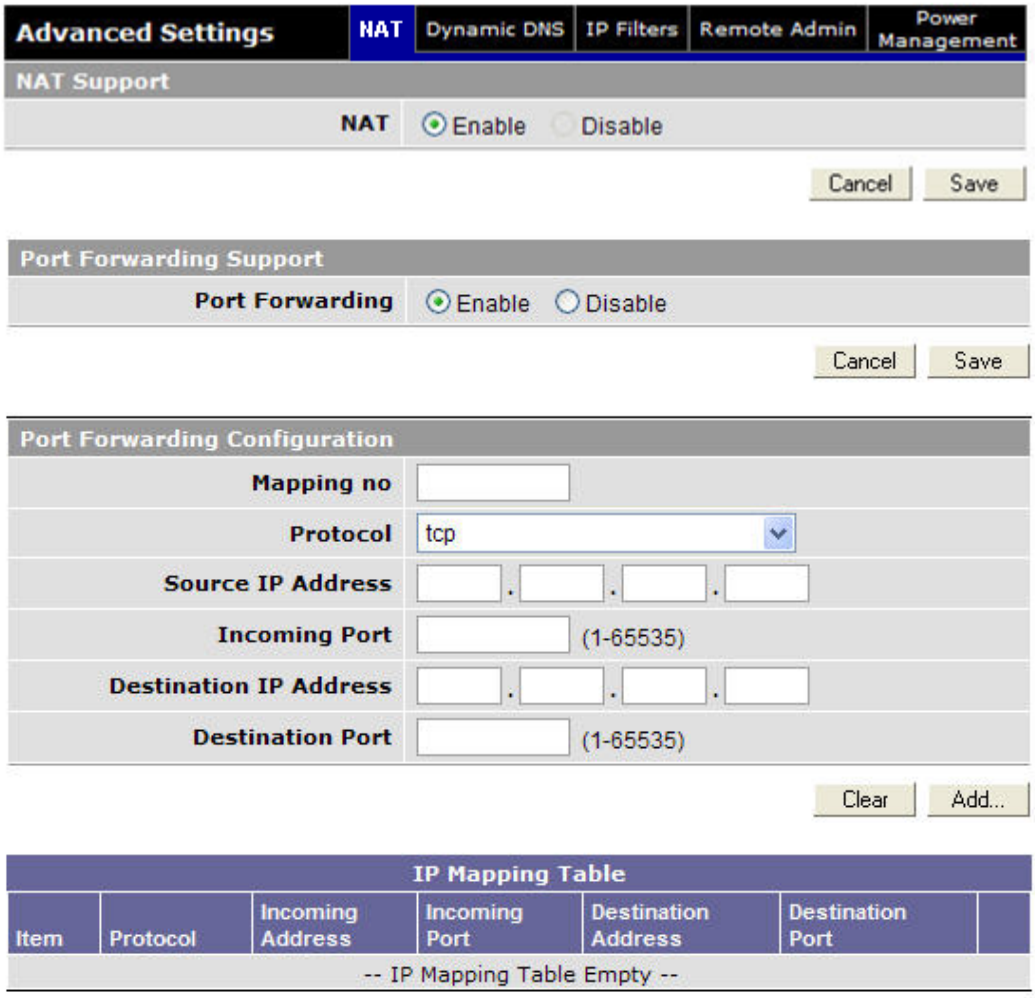


Figure 26 - Port Forwarding Screen

NAT: Network Address Translation (NAT) on the WAN interface of the Vanguard 3G unit. When NAT is enabled, the LAN (Ethernet) is considered private, the WAN is considered public. Any IP packets leaving the Vanguard 3G unit through the WAN interface will have its source IP address changed to that of the WAN interface.

Port Forwarding: Enable - The Vanguard 3G unit performs port forwarding. The "IP Mapping Table" contains the rules used to perform port forwarding.
Disable - The Vanguard 3G unit does not perform port forwarding on the WAN interface.

Mapping Number: User selected generic number assigned for this route.

Protocol: TCP, UDP, or both - driven by the protocol used by the third party device

Source IP Address: Enter the IP address of the remote PC connecting to the third party device. (This should only be done if a single PC with a STATIC IP is accessing the device and you want to limit access to the device.) If you will be accessing the third party device from multiple PCs, or from a PC that has a dynamically assigned WAN IP, enter 0.0.0.0 (wildcard) to allow all remote PCs to access the third party device.

Incoming Port: Enter the port of incoming request. This can be any non-conflicting port (can be the same as the destination port). This value must be entered following the Vanguard 3G IP address into a browser on a remote PC to access the third party device.

Destination IP Address: IP address of third party device; must be on the same subnet as the Vanguard 3G radio modem.

Destination Port: Enter the port of the third party device. This will be assigned to the device by the third party manufacturer and should be in the user manual of the third party device

IMPORTANT NOTE:

The password protection on the Vanguard 3G product does not protect logging into a third party device. The third party device must provide its own password protection (confirm if password protection is required).

Click Add when route configuration is complete. The route will be displayed at the bottom of the page. Additional routes may be added but require a unique mapping number and port number. Routes can be deleted (cleared) if no longer needed.

Once the route of the third party device is added you can enter the following on a remote PC to access the third party device.

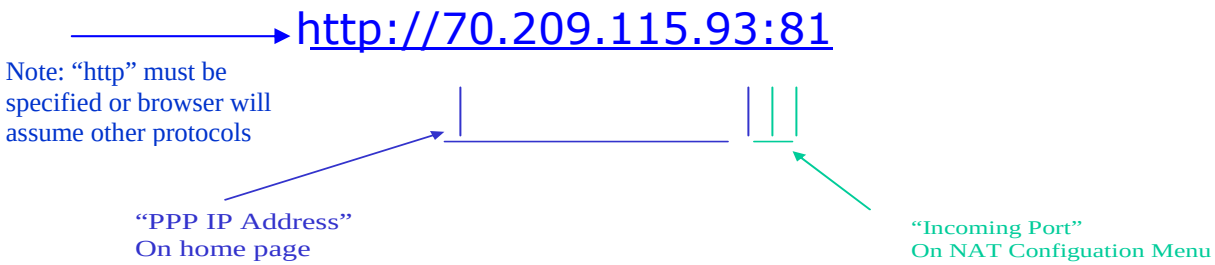

http://70.209.115.93:81
Note: "http" must be specified or browser will assume other protocols
"PPP IP Address" On home page
"Incoming Port" On NAT Configuation Menu

Figure 27 - Third Party Device Remote Access Example

5.7.2 Advanced Settings-Dynamic DNS (NO-IP Configuration)

Dynamic DNS is an option for remote monitoring if a static WAN IP address is not available or not yet assigned. When Dynamic DNS is activated, the Vanguard 3G radio modem will register its dynamically assigned IP address with NO-IP's application, allowing the user to login to the device remotely without knowing the IP address of the Vanguard 3G radio modem.

A number of providers offer services to track dynamic IP addresses and map them to constant domain names. The Vanguard 3G product supports connection with NO-IP.com, one provider of this service.

NOTE:

As it is more reliable CalAmp recommends the use of a static IP whenever possible.

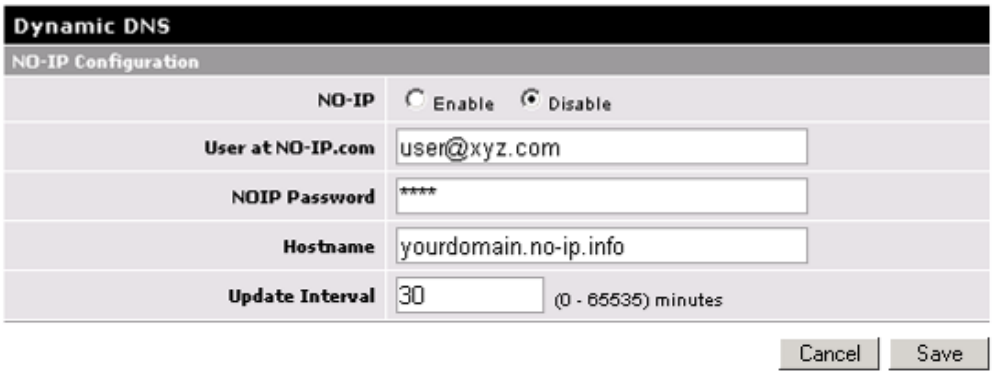


Figure 28 - Dynamic DNS (NO-IP Configuration) Setup Screen

NO-IP: Enable/Disable (disabled by default)

User at NO-IP.com: User name setup at NO-IP.com. This information is required when logging into your account.

NOIP Password: Password used when logging into your account at NO-IP.

Hostname: This is unique domain name setup on your NO-IP account. This is the domain name entered into a browser to remotely login to the Vanguard 3G radio modem. You may have multiple host names registered on the same account. See section below for instructions to set up NO IP account and host name.

IMPORTANT NOTE:

Do not assign more than one Vanguard 3G unit the same domain name.

Update Interval: This setting determines how often the device will update its IP information at NO-IP. The IP addresses assigned by the carrier are dynamic; therefore it is necessary to update the registered IP periodically. Setting a high value in this field may cause extended periods of no connection but will reduce the number of times the Vanguard 3G registers, decreasing the amount data used on the contract. Setting a low value minimizes the chance of lost network connection but will increase the total amount of data used on the contract.

The Vanguard 3G radio modem will always register when first powered up or upon hardware reset.

5.7.2.1 Instruction for NO IP setup

1. Setup an account at NO-IP.com http://www.no-ip.com/. You will need to setup a user name and password on your account
2. On No-IP, create a host account for each device you want to remotely monitor. The domain name you set up here will be used to remotely login to the device.
3. On the Vanguard 3G radio modem, click "Dynamic DNS" on the left side of the web Browser.
4. Enable NO-IP
5. Enter your NO-IP username, password and hostname for this device (do not assign the same host name to multiple devices.)
6. Set the update interval (30 minutes is the default).
7. After registration is complete, you can login into the unit or use the port forwarding feature by entering the hostname into a web browser followed by the port number.

   (Example http://Vanguard_user.no-ip.biz:8080)

5.7.3 Advanced Settings- IP Filter

IP Filtering provides certain Internet firewall protection. The user can enter up to 20 IP filters. Each IP filter is identified by a unique number (from 1 to 20). When IP filtering is enabled, any custom IP filters entered by the user as well as predefined IP filters will be taken into account when processing IP packets. See Figure 29.

An IP packet passes through the filtering logic when IP filtering is enabled:

1) An IP packet is received on one of the interface and is destined to the Vanguard 3G unit
OR
2) An IP packet is sent by the Vanguard 3G unit
OR
3) An IP packet is forwarded by the Vanguard 3G unit.

5.7.3.1 Predefined IP Filters

Block Remote Pings: If IP filtering is enabled, any ICMP echo request coming from the WAN interface will not be replied to. This prevents remote hosts from detecting your IP address on the WAN.
Block Remote IP Fragments: If IP filtering is enabled, any fragmented IP packets coming from the WAN interface will be dropped.

5.7.3.2 Add Custom IP Filters

Fill in the parameters described below and click "Add…". Your entry should appear in the **Custom IP Filters** table on the bottom of the page.

Note: Criteria are for inclusion by default. Select "exclude" if you criterion is for exclusion.

Filter Number: Each IP filter is identified by a unique number from 1 to 20.

Source IP Address:

Any	Any source IP Address will satisfy these criteria.
Specific	A specific Host IP address.
Range	A range of IP addresses.

Destination IP Address:

Any	Any destination IP Address will satisfy these criteria.
Specific	A specific Host IP address.
Range	A range of IP addresses.

Protocol:

Any	Any protocol number.
ICMP	The ICMP protocol (1).
TCP	The TCP protocol (6).
UDP	The UDP protocol (17).
Other	Any other IP protocol.

Source Port:

Any	Any source port number.
Specific	A specific source port number
Range	A range of source port numbers

Destination Port:

Any	Any destination port number.
Specific	A specific destination port number
Range	A range of destination port numbers

Direction: The direction corresponds to the path taken by the IP packet inside the Vanguard 3G unit.

An IP packet can TERMINATE inside the Vanguard 3G unit.	
wan2ciphr	The IP packet is received from the WAN interface and is destined to the Vanguard 3G unit.
eth2ciphr	The IP packet is received from the Ethernet interface and is destined to the Vanguard 3G unit.
wifi2ciphr	The IP packet is received from the WiFi interface and is destined to the Vanguard 3G unit.
An IP packet can ORIGINATE from the Vanguard 3G unit.	
ciphr2wan	The IP packet is sent by the Vanguard 3G unit to the WAN interface.

ciphr2eth	The IP packet is sent by the Vanguard 3G unit to the Ethernet interface.
ciphr2wifi	The IP packet is sent by the Vanguard 3G unit to the WiFi interface.
An IP packet can be FORWARDED by the Vanguard 3G unit	
wan2eth	The IP packet is received on the WAN interface and forwarded to the Ethernet interface.
wan2wifi	The IP packet is received on the WAN interface and forwarded to the WiFi interface.
eth2wan	The IP packet is received on the Ethernet interface and forwarded to the WAN interface.
eth2wifi	The IP packet is received on the Ethernet interface and forwarded to the WiFi interface.
wifi2eth	The IP packet is received on the WiFi interface and forwarded to the Ethernet interface.
wifi2wan	The IP packet is received on the WiFi interface and forwarded to the WAN interface.

Action:

Keep	If IP filtering is enabled and an IP packet matches all criteria in the IP filter, keep the IP packet (continue normal processing of the IP packet).
Drop	If IP filtering is enabled and an IP packet matches all criteria in the IP filter, drop the IP packet.

5.7.3.3 Delete Custom IP Filters

Type the filter number (from 1 to 20) in "Filter Number" and click "Delete…". The entry should be deleted from the **Custom IP Filters** table.

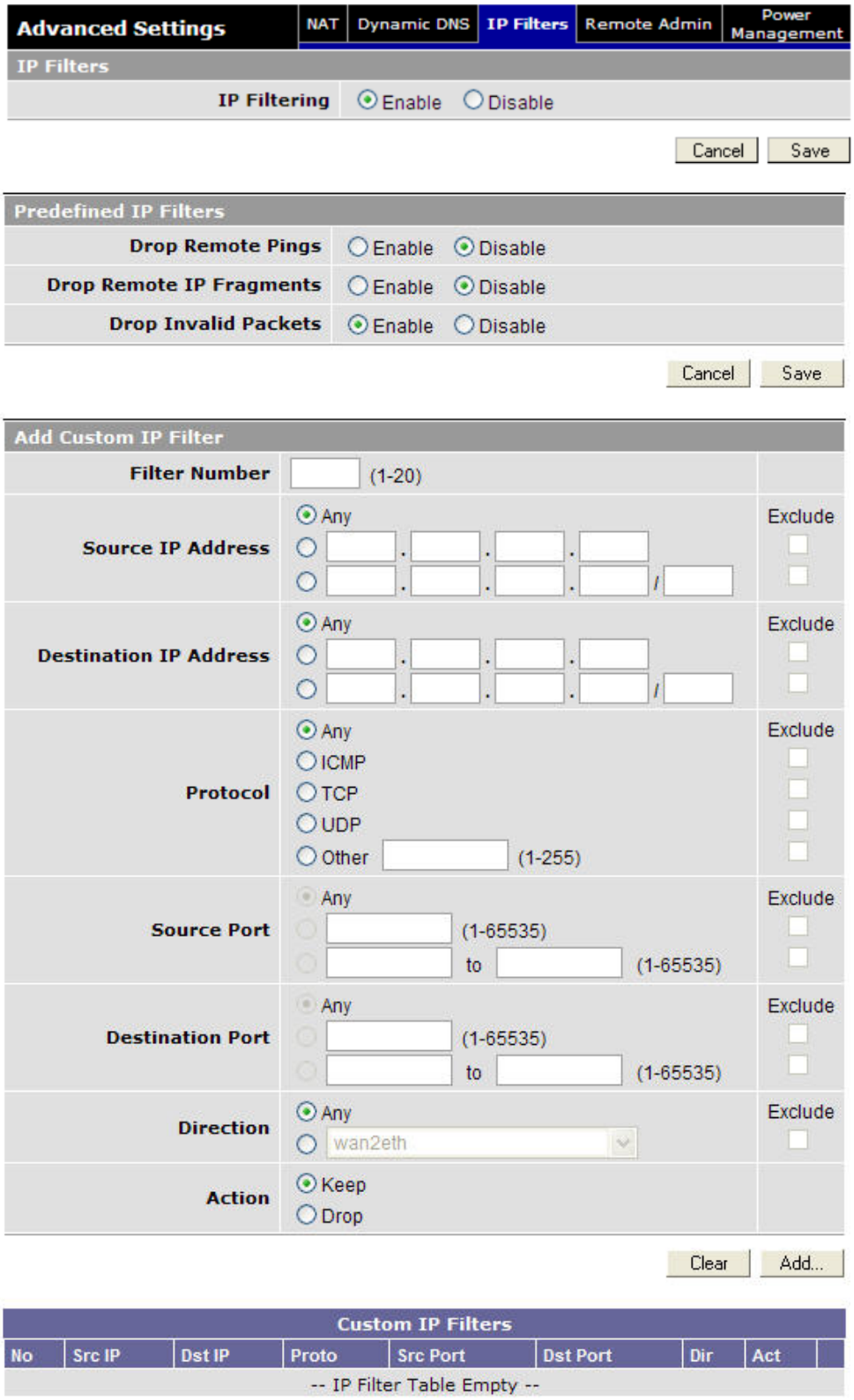


Figure 29 - IP Filter

5.7.4 Advanced Settings-Remote Admin and Power Management

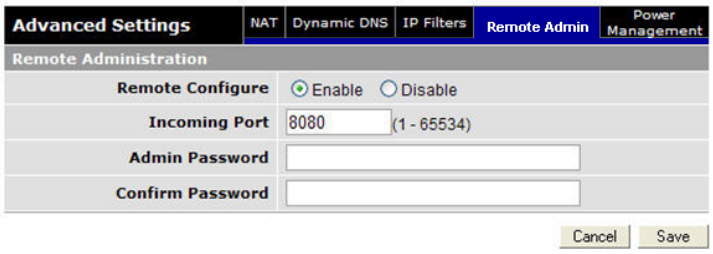


Figure 30 - Remote Admin

5.7.4.1 Remote Admin

Remote Configure: Selecting Enable will allow remote access to the modem's configuration screens through the cellular network connection. Selecting Disable will shut off the ability to remotely access the modem's configuration screens.

Incoming Port: Change the port of incoming requests. It is not necessary to change this parameter unless it conflicts with other devices on the network.

Admin Password: Set the password for **BOTH** remote login and local login. The password must be entered twice for the password to change.

Note:

Changing any remote administration parameters remotely will cause the remote user to lose contact with the Vanguard 3G unit. Login using new parameters to re-establish a connection.

IMPORTANT NOTE:

Users can be logged into a single unit both locally and remotely at the same time. Changes made on one end will not be reflected on the other unless the web page is refreshed.

5.7.4.1.1 Example of Remote Login

The following should be entered into a browser on a remote PC to remote login to the Vanguard 3G radio modem. The Vanguard 3G unit must have remote administration enabled for this functionality

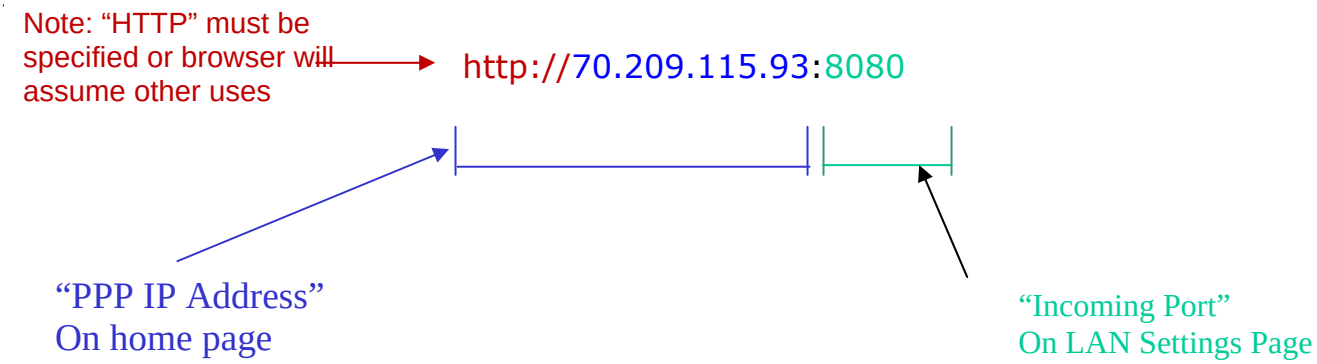

Note: "HTTP" must be specified or browser will assume other uses
http://70.209.115.93:8080
"PPP IP Address"
On home page
"Incoming Port"
On LAN Settings Page

Figure 31 - IP Address Definitions

5.7.4.2 Power Management

The VANGUARD 3G unit is designed to stay ON even if the ignition is turned OFF. You can configure your Vanguard 3G unit to automatically shut down 1, 5, 30, or 60 minutes after ignition is turned off or when the supply voltage drops to a certain level.

Shutdown Method: Disabled by default (unit always ON after ignition is turned OFF). Select "Power Off" to enable power management.

After ignition line off: Select between the following time intervals: 1 minute, 5 minutes, 30 minutes, or 60 minutes.

When Voltage Drops to: Enter desired voltage. Enter "0" to disable. (Note: A value of 11V would be usually entered here as a precaution in order to ensure the car battery does not drain.)

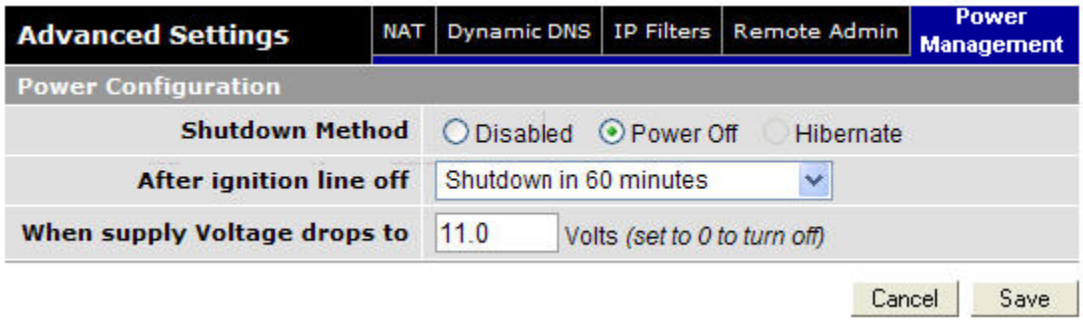


Figure 32 - Power Management

5.8 SNMP

Not supported in the current version

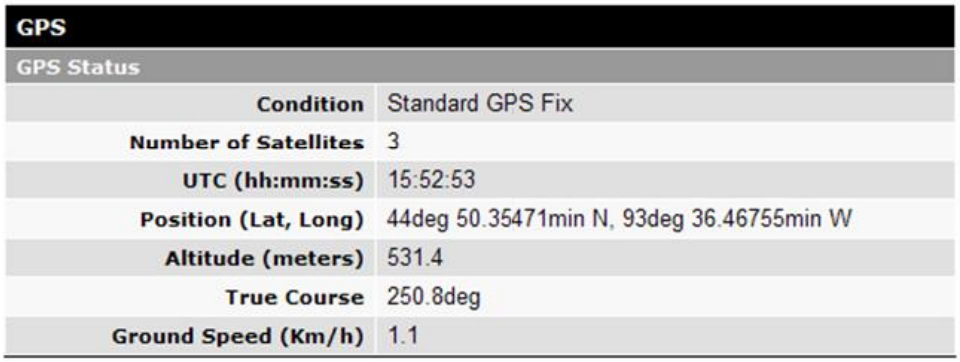
5.9 GPS Status and Settings

The Vanguard 3G unit incorporates a highly sensitive 16-channel GPS receiver and an intelligent algorithm that offers outstanding receive sensitivity. Summarized below are the specifications of the integrated GPS module:

Typical Acquisition sensitivity	-138 dBm
Typical Tracking sensitivity	-147 dBm
Reacquisition time	Less than 1 second
Average Cold/Warm/Hot Start time to first fix	Under 45/33/3.5 seconds
Position Accuracy	
2D CEP	2.5 meters
3D SEP	5 meters
DGPS corrected	<2 meters

The GPS page allows the user to see the GPS status and configure remote or local delivery of GPS position reports. Viewing the GPS data from a local or remote PC requires a UDP port listener program be installed on the PC. Any UDP listener will work provided you can set an appropriate port value for the program.

5.9.1 GPS Status



GPS	
GPS Status	
Condition	Standard GPS Fix
Number of Satellites	3
UTC (hh:mm:ss)	15:52:53
Position (Lat, Long)	44deg 50.35471min N, 93deg 36.46755min W
Altitude (meters)	531.4
True Course	250.8deg
Ground Speed (Km/h)	1.1

Figure 33 - GPS Status

Condition: Indicates No Fix, Standard GPS Fix, Differential GPS Fix, or Estimated / Last Known Position

Number of Satellites: Indicates the number of satellites the GPS has locked on to. A minimum of 3 is required to establish a position. Generally, the more satellites the GPS has locked, the more accurate the position reporting will be.

UTC: Time of day in Universal Coordinated Time

Position: Device position reported in degrees and minutes

Altitude: Altitude from Mean Sea Level reported in meters.

True Course: Heading, reported in degrees (0 – 360)

Ground Speed: Reported in km/hr

5.9.2 AAVL Settings (Local and Remote Delivery)

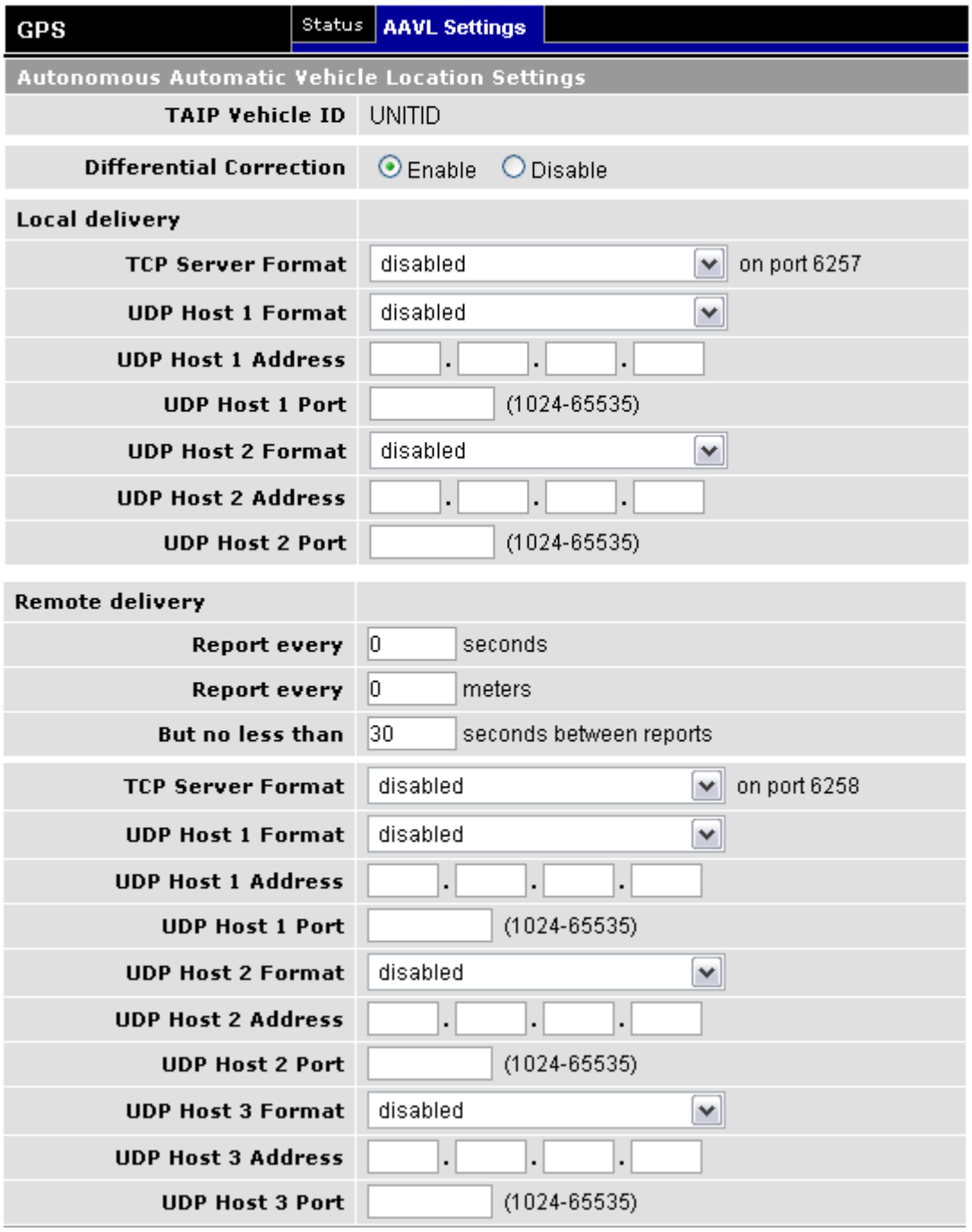


Figure 34 - GPS Local Delivery

TAIP Vehicle ID: User assigned number to identify the vehicle or Vanguard 3G unit that each GPS report belongs to. This will be reported in the GPS messages if TAIP with ID is selected for TCP Server Format and/or UDP Host format. Configured under Basic Settings.

Differential Correction: Differential GPS corrects various inaccuracies in the GPS system to yield measurements accurate to a couple of meters when the mobile is moving and even better when stationary.

5.9.3 Local Delivery

The GPS data can be delivered to up to two local PCs with UDP viewer programs can provide data through a TCP connection, e.g. telnet. GPS data will be delivered once per second to all local PCs

TCP Server Format: Select one of the following options for the format of the GPS messages

TAIP no ID: Trimble ASCII Interface Protocol, a Trimble specified digital communication interface. When this option is selected, the TAIP vehicle ID is not included in the GPS messages.

TAIP with ID: Same as above except the Vehicle ID is reported

NMEA National Marine Electronics Association interface specification for electronic equipment. The NMEA GPS message set includes several message types, each containing specific GPS information. See message descriptions below. TAIP Vehicle ID is not reported when NMEA is selected.

NMEA GLL: Position in LAT/LONG coordinates and time of day in UTC coordinates.

NMEA GGA: Position in LAT/LONG coordinates, time of day in UTC coordinates, fix quality, number of satellites and altitude

NMEA RMC: Position in LAT/LONG coordinates, time of day in UTC coordinates, ground speed in knots, heading in degrees and date

NMEA VTG: Ground speed in kilometers per hour and knots, heading in degrees.

To get GPS data by telneting into the device, enter the following from a prompt

telnet <local IP address of the Vanguard> 6257.

Note:

It is possible to telnet to the Vanguard 3G unit's port 6257 from a remote location however this is not recommended as delivering the data once per second across the cellular network will greatly increase the amount of data transferred on the cellular contract.

UDP Host Format: Same options as TCP server format

UDP Host Address: IP address of local PC that GPS data will be delivered to. This address must be on the same subnet as the Vanguard 3G LAN IP

UDP Host Port: Port assigned to UDP program. This must match the port assigned in the chosen UDP Port Listener Program.

Warning: Due to the dynamic nature of the WAN IP address on some cellular networks, remote GPS reports being sent to a Host via UDP may start arriving with a different IP address. In order for the Host to be able to identify the source of the report it is recommended to:

a) Use "TAIP, with ID" reports as they contain Vehicle ID field that can be set uniquely for each mobile

OR

b) Use middleware that maintains a constant IP address across cell towers.

5.9.4 Remote Delivery

The GPS data can be delivered to up to three remote PCs with UDP viewer programs running on the host.

Report every: GPS can be programmed to report position after a specified time has elapsed or the unit has moved a specified distance since its last report.

But no less than: This feature prevents a fast moving vehicle from reporting too frequently if its "Report every ….. meters" setting is sufficiently low" by setting a minimum amount of time, in seconds, between GPS reports.

5.10 Serial Port Settings

The following settings allow local or remote GPS reports to be sent out to the user COM port.

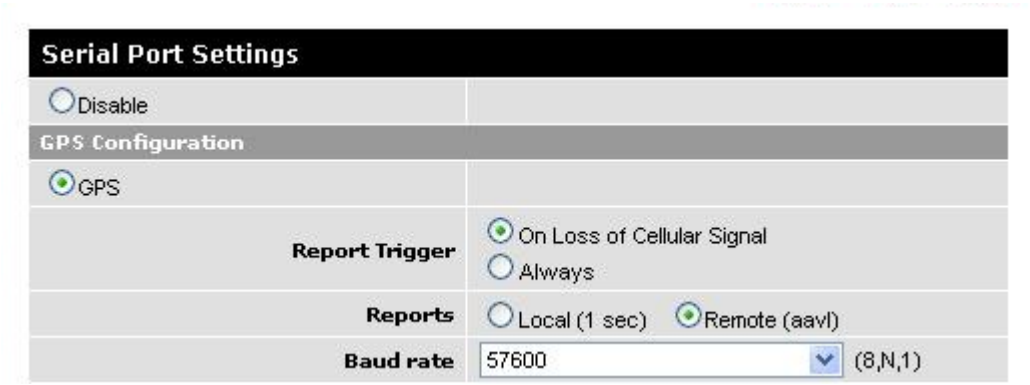


Figure 35 – Serial Port Settings

The serial port settings are disabled by default. To enable GPS reports to be sent out to the user COM port, select "GPS". The GPS reports could be sent over the serial port "Always" or only "On Loss of Cellular Signal".

Note that the following delays apply if the latter is selected:

On power-up: Reports are delayed for 90 seconds to allow time for cellular connectivity to be established.

During Operation: Reports are delayed for 30 seconds after loss of cellular connectivity is detected.

Select "Local (1 sec)" if every GPS report is required or "Remote (aavl)" for GPS reports to be sent out based on the AAVL settings (see AAVL settings, section 5.9.4).

Note: GPS Report format is set in the "TCP Server Format" pick lists on the GPS web page.

5.11 I/O Settings

The Vanguard 3G modem supports the following I/Os:

- Vanguard 3G Input Status: Ignition Sense, Main Voltage indication, and Modem Temperature
- Four general purpose external analog input lines (AIN1…AIN4)
- Four general purpose external digital input lines (DIN1…DIN4)
- Four general purpose external digital outputs (relay-driven contact closures). Implemented as four sets of SPST contacts with leads labeled:
  NO1-COM1
  NO2-COM2
  NO3-COM3
  NO4-COM4

See Table 6 for pinout.

PIN#	Description
Pin1	AIN4
Pin2	AIN2
Pin3	Analog ground*
Pin4	COM4
Pin5	NO4
Pin6	COM2
Pin7	NO2
Pin8	Not used
Pin9	Digital ground**
Pin10	DIN4
Pin11	DIN2
Pin12	AIN3
Pin13	AIN1
Pin14	Analog ground*
Pin15	COM3
Pin16	NO3
Pin17	COM1
Pin18	NO1
Pin19	Not Used
Pin20	Digital ground**
Pin21	DIN3
Pin22	DIN1

*AIN1 to AIN4 inputs are referred to the Analog ground (pins 3 and 14)
**DIN1 to DIN4 are referred to the Digital ground (pins 9 and 20)

Table 6 - I/O Signal Pinout

Table 7 - I/O Signal Specifications

Input Type	Label	Specification
Analog Input	AIN1…AIN4	External input voltage range: 0 to+28 Volts
Digital Input	DIN1…DIN4	Logical level inputs, Schmitt-trigger Positive threshold voltage: 2.2V max Negative threshold voltage: 0.6V min Maximum input voltage: 5.5V
General Purpose External Digital Outputs	NO1-COM1 NO2-COM2 NO3-COM3 NO4-COM4 The default Vanguard 3G power-up state for each relay is open (no contact between COM and NO output lines)	Nominal Switching Capacity (resistive load) 1A, 30VDC 0.3A, 125 VAC

5.11.1 Debouncing

All analog and digital input signals are debounced for 500ms. Generation of all alarms and indications is subject to a 500ms debouncing.

5.11.2 I/O Configuration

The Vanguard 3G I/O subsystem is configured via the Vanguard 3G WEB pages. Status Monitoring is provided via NMEA-based protocol. The Vanguard 3G I/O subsystem operates according to a manager/agent model. The PC-hosted manager sends requests to the Vanguard 3G I/O agent, which performs the required actions. The Vanguard 3G agent reports alarms and indications to the PC-hosted manager.

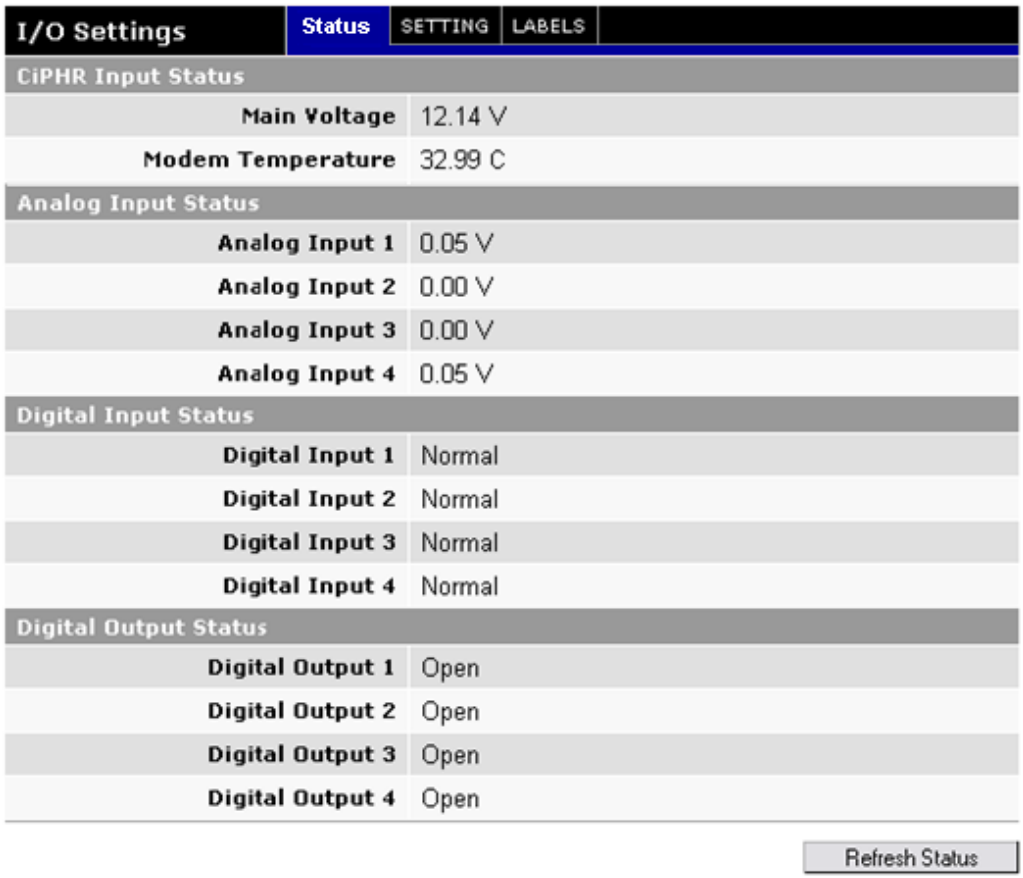


Figure 36 - I/O Settings-Status

The Manager IP address is configured under I/O Settings→NMEA Settings→ **Manager IP address** (see Figure 37).
The port number is 1234 by default and can be customized under I/O Settings→NMEA Settings→ Manager IP address→ **Port.**

Note: If Auto is selected for "Manager IP address", the Vanguard 3G automatically computes the manager IP address to be Vanguard 3G ETH address +1 if DHCP is disabled. If DHCP is enabled, the IP address is the starting address offered by the DHCP server.

The unit IP address is the source IP address (displayed in the alarm messages received by the Manager). The user can configure this to be the Cellular (WAN) Vanguard 3G IP address or the LAN (Ethernet) Vanguard 3G IP address. If auto is selected, the source IP address is automatically computed to be Vanguard 3G ETH address +1 if DHCP is disabled. If DHCP is enabled, the IP address is the starting address offered by the DHCP server.

For each analog diagnostic value displayed, the user can control alarms conditions in the following ways:

- Set acceptable range of values by entering the low and high thresholds.

- Choose to be notified when the value goes out of acceptable range and returns into range by enabling each diagnostic value.

The user can also enable and disable digital alarms by selecting appropriate "enable" and "disable" radio buttons.

The alarm messages can be configured for each diagnostic value under I/O Settings→Labels (see Figure 38) for both going out of range (OOR) and returning to normal (Normal).
Remember to save your settings for each configuration.

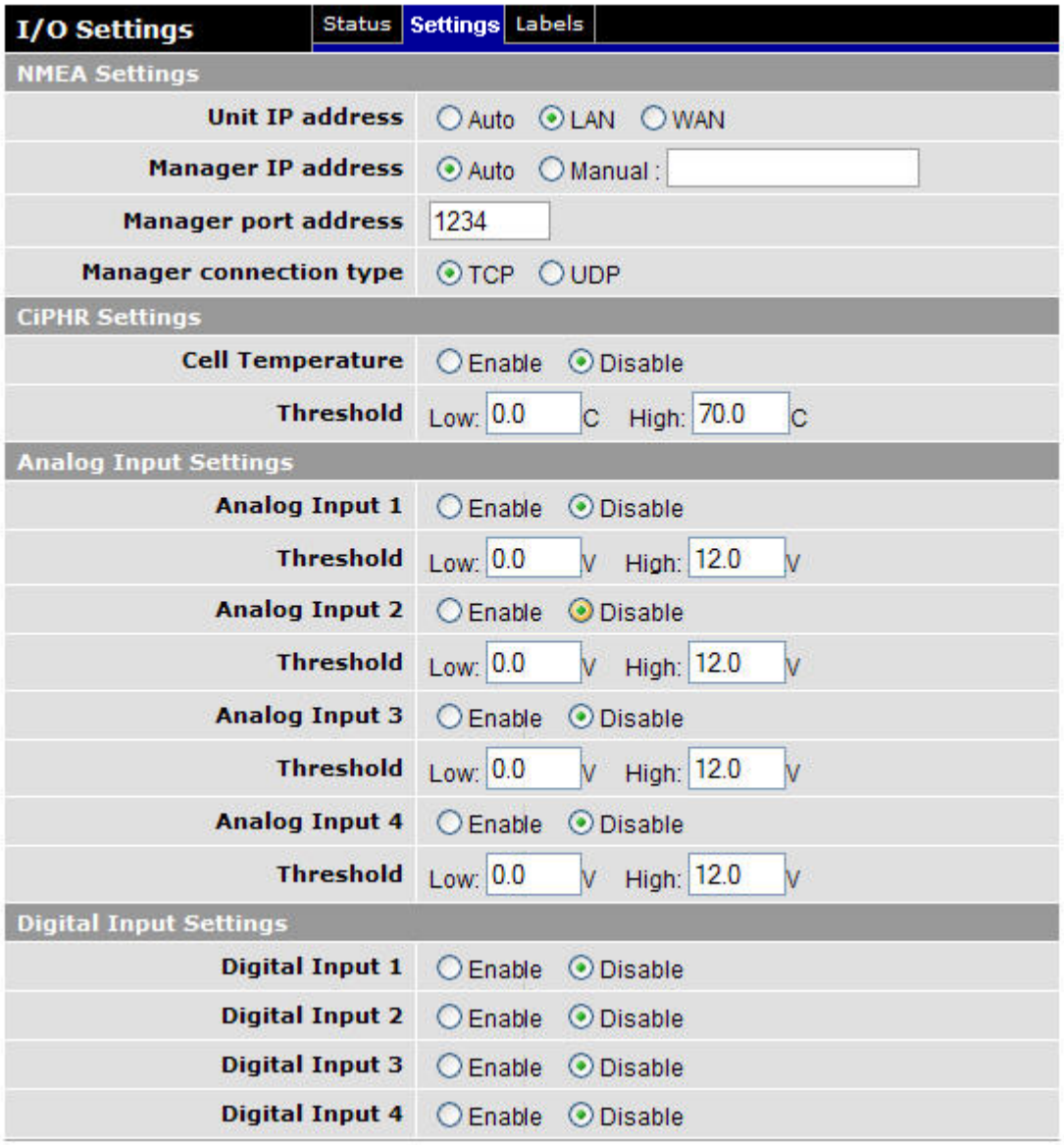


Figure 37 - I/O Settings

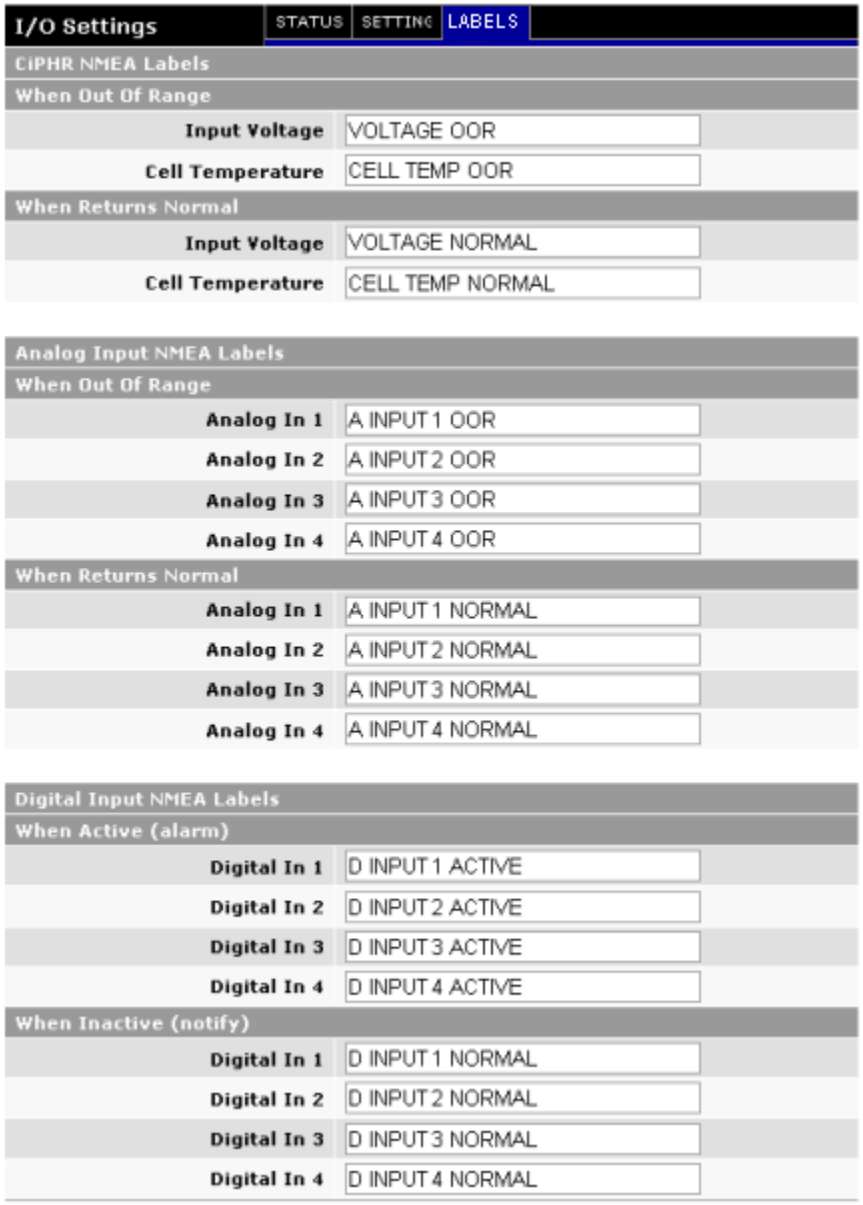


Figure 38 - I/O Settings-Labels

Note: For more information on Vanguard 3G I/O Settings and Configuration refer to TIS082.

5.12 System Upgrade (Optional Service)

It is possible to update the system by receiving an update file from CalAmp Corp. This may be done periodically to add features or fix errata. When you receive an update file, perform the following to update the unit. Upgrading can only be performed from a local PC, not remotely.

- Save the file on a local drive or network accessible directory.
- On the System Upgrade page, browse to the update file and select it.
- Click Save. The system update can take up to 4 minutes. The unit will restart when the upgrade is completed.

This will not delete your configuration settings.

6. CARRIER SPECIFIC INFORMATION

Each cellular provider uses a different PRI file that needs to be programmed into the modem for the modem to register properly on their cellular network and connect. These PRI files are typically programmed into the modem by the manufacturer of the RF module or by CalAmp Corp using proprietary programming software. The following sections list different carriers and the requirements for activating modems on their networks. Cellular providers will (where applicable) supply username and password formats for making EVDO calls. Dataradio modems support the service provisioning features called Over-the-Air Service Provisioning (OTASP) and Over-the-Air Parameter Administration (OTAPA). OTASP occurs when a user initiates a call to the service provider. No further commands are (typically) required to provision the modem. For example, a user with a new modem/phone without service programming data can call the service provider's special OTASP number to have the device programmed without physically taking it to the service provider. OTAPA occurs when the network initiates a call to the modem and programs it without any user intervention. OTAPA is typically used when the service provider decides to update information on many cellular devices at the same time.

Note:

Dataradio Vanguard 3G radio modems are carrier specific, you must specify the carrier you will be using when ordering. A unit purchased for one carrier cannot be activated on any other carrier.

Note:

Generally, you will not be able to provision a device if you are not in your home network area. You will also need to make sure that you have sufficient signal strength to perform provisioning.

Verizon Wireless

Note:

Before starting the OTA process, ensure that you have a strong enough signal for cellular communication

When you activate a contract with Verizon, Verizon will assign a 10 digit MDN/MIN number to your module's ESN. When this is done, you are ready to OTA the module. Verizon activation is done by submitting an OTA command of *22899 to the Verizon network. This command is entered by default into the OTA command box on the "WAN Cellular Page". It should not be necessary to modify this command, simply select OTASP, click "Submit" and allow the activation to complete. This process may take several minutes. This command is also used to update the PRL file. When the OTA is complete, the MDN provided by Verizon should be displayed on the home page.

Bell Mobility

Activation on the Bell mobility network requires manual entry of the MDN, MIN and Unlock code. Bell will provide these numbers when you initiate your data contract with them. In most cases, the MDN and MIN will be the same number. On the WAN Cellular page, enter the MDN, MIN and Unlock code and click "Submit". The activation process will occur automatically once the parameters are entered. This process may take a few minutes and you may need to reset the device to have full network access.

Sprint PCS

IOTA Provisioning

The 3GPD parameters are easily configured using Over The Air Provisioning. Sprint PCS uses IOTA (IP-based Over The Air) for their OTA provisioning system. IOTA uses packet data calls to transfer the configuration data to the modem. These IOTA data sessions can be network initiated or Client initiated. Network Initiated IOTA is the preferred method. An automatic network initiated IOTA session occurs when the module first registers onto the Sprint network. This IOTA session is queued when Sprint originally sets up and 'activates' the account. In their current implementation, Sprint imposes a 72 hour expiration timer for this queued IOTA session. An IOTA session has a device time out of 15 minutes. If unsuccessful after 15 minutes, the status changes to fail and the module stops trying. A normal IOTA session takes from 1 to 3 minutes. To register on the network, the module needs a sufficient signal and requires manual provisioning with the MDN and MSID. The IOTA session will occur and populate the 3GPD parameters. If it is the first IOTA session, it is called a Network Initiated Initial Provisioning (NIIP.)

NOTE:

An IOTA session MUST occur while the device has sufficient signal and is registered on the Sprint PCS Network. A session will not be successful if the device is out of coverage or not properly registered on the Sprint PCS network.

7. TROUBLESHOOTING

This section lists some of the most common problems occurred while setting up the Vanguard 3G unit and troubleshooting tips to fix the problem.

Cannot Connect to the Home Page

Step 1:

Open a DOS command prompt on your PC. *(Start - > Programs -> Accessories->Command Prompt_*

Enter the command "ipconfig" at the prompt. *This will display all IP information assigned to the PC including the IP address, subnet mask and gateway.*

The Default gateway should be "192.168.1.50" if you are using a new Vanguard 3G unit or should be whatever was assigned as the Ethernet IP of the Vanguard 3G unit during previous configurations.

If this is the address, skip to step 2.

If the address is other than expected, but is a private IP (see Network basics) and the IP address and gateway are on the same subnet, enter that address in a browser to establish connection. If this does not fix the problem, skip to step 2.

If the gateway is not the expected value and does not follow the above format:

1. Close all active browsers
2. On the "Network and Dial-Up Connections Page" confirm that the network settings are set to automatically detect an IP and DNS server.
3. Verify that there are no other active connections; specifically be sure that all wireless cards are disabled.
4. Disable, and then Re-enable the network connection. (Some older versions of Windows do not update network setting automatically, you need to re-enable the network settings or restart the PC to set updated network settings.)
5. Enter "ipconfig" in the command prompt; verify that the Default gateway is now correct.
6. Enter the gateway IP address into a browser, if this does not fix your problem skip to step 2. If the gateway is still not in the correct format, skip to step 3.

Step 2:

Enter "ipconfig" in the command prompt as instructed above. The IP address should be of the format 192.168.1.xxx if you have new unit or should be on the same subnet if you have changed the Ethernet IP, but should not be the same as the Default gateway. If the address is in the correct format and not the same as the Gateway, skip to step 3.

If it is not correct, open the properties window of the network connection. Manually enter a unique IP address on the same subnet as the gateway (use 192.168.1.100 if you have not changed the default) and save the properties. (Note: You may need to disable/re-enable the connection to get the new settings to take effect). This should allow you to connect to the device. Once you are connected, check the DHCP settings; the DHCP server may be disabled.

Step 3:

Check the following

1. Confirm you are using a working Ethernet cable. Try a different Ethernet cable if necessary.
2. Confirm the Ethernet port you are plugging into on your PC is active.
3. Confirm power supply for your unit is functioning. Refer to LED behavior (section 2.5.2).

Cannot Connect to the Internet

1. Check the Signal Strength on the home page. If the signal strength is poor, check your antenna connections and placement. Try a different antenna if possible.

2. On the "Dial Settings" page, confirm that the autodial is enabled. If it is disabled, enable it and cycle power.

3. On the "WAN Cellular" page, check that the correct mobile identification number is displayed. If an incorrect number or no number is displayed, it is an indication that your carrier contract is not activated, or the device has not been initiated. If you have not performed an over the air activation (OTASP for Verizon, IOTA for Sprint) perform that now.

4. If you have confirmed all of the above, or the over the air activation fails, contact your network provider to confirm that your contract is active.

Internet Connection is Slow or Intermittent

Note:

The speed and strength of your Internet connection can be affected by many things out of the control of the Vanguard 3G radio modem such as your location and the overall level of network traffic. CalAmp Corp cannot guarantee any speed or coverage.

1. Check the signal strength on the home page. If it is listed as good or medium, skip to the next step. You may want to refresh the home page a few times to make sure the signal strength is consistent. If the signal strength is poor, check you antenna connections or try a new antenna if possible. If this does not fix the problem, verify network coverage in your location with your network provider. Check the Service type. If EVDO is listed, skip to the next step.

2. If 1xRTT is listed, the Vanguard 3G unit has not found an available EVDO network. The Vanguard 3G unit *will* provide network access when *only* a 1xRTT connection is available but the speed of the network connection will be much slower. Contact your service provider to confirm EVDO coverage.

3. Check the DHCP lease time. If this is set to a high value (>1000 seconds), skip to the next step. If the lease time setting is set to 0 or a low value, reset to a higher value. Unless you have a specific reason for limiting the lease time, this should always be set to the maximum value.

4. If you have completed all steps above and still have poor network performance, perform a speed test on the device to confirm the connection speed (example: speakeasy.net). If the speed test shows acceptable download and upload speeds, the problem is most likely with the specific Internet site you are trying to connect to and not the Vanguard 3G radio modem.

8. SPECIFICATIONS

Product specifications are subject to change without notice.

GENERAL SPECIFICATIONS

Interface Connectors: RS-232 DE-9S Connector (DCE female)
10/100 Base-T Full Duplex
USB Client port[3]

Power Connector: Molex 43045-4000 MicroFit 3.0, 4 pin header

LED Indicators: WiFi, PWR, STAT, NET, GPS

Antenna Interface: Primary Antenna: 50-Ohm TNC Female
Diversity Antenna: 50-Ohm SMA Female
GPS Antenna: 50-Ohm, 3.3V SMA Female
WiFi Antenna: 50-Ohm RP-SMA Plug

Size: 5.5 (L) x 6.0 (W) x 1.8(H) inches (14 x 15.25 x 4.5 cm)

Weight: 2.65lb (1.2 kg)

Power Input: 9-28 VDC

Current Consumption[4] (Average at 13.8 VDC)

Current Consumption	RX Mode	TX Mode
With WiFi module	240 mA	500 mA
Without WiFi module	130 mA	350 mA

Max TX Power Range: (Includes cable loss 0.5dB) CDMA: 22.5-24.5 dBm
WiFi: 15.5–17.5 dBm (802.11b) & 11.5–13.5 dBm (802.11g)

Rx Sensitivity: CDMA: <-104 dBm
WiFi: <-83 dBm (802.11b) & <-70 dBm (802.11g)

Frequencies: Cellular: TX: 824-849 MHz RX: 869-894 MHz
PCS: TX: 1850-1910 MHz RX: 1930-1990 MHz
WIFI: TX/RX: 2412-2462MHz

Temperature: Operating: -30°C to +60°C 100% duty cycle
Note: Cellular TX power may be reduced outside this range
Storage: -40° to +85°C (-40° to 185°F)

Vibration: MIL-STD-810F Method 514.4

Shock: MIL-STD-810F, Method 516.5

Emissions: FCC Part 15b

Transport Protocol: UDP/TCP

Command Protocol: Web Interface

Certifications: FCC ID: EOT14071R2 IC: 773A-14071R2
EU : RoHS, CE Australia: A-TICK

[3] Reserved for future use

[4] Current consumption while transmitting is dependent on the TX power level of the cellular module. The TX power level of the module is controlled by the cellular base station, not the Vanguard 3G software

9. ABBREVIATIONS

Abbreviation	Description
CDMA	Code Division Multiple Access
CTS	Clear to Send
DHCP	Dynamic Host Configuration Protocol
DNS	Domain name Server
ESN	Electronic Serial Number
EVDO	Evolution Data Optimized
GPRS	General Packet Radio Service
GPS	Global Positioning System
HSDPA	High Speed Downlink Packet Access
IOTA	Internet Over the Air
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
NAT	Network Address Translation
OTA	Over the Air
OTASP	Over the Air Service Provisioning
PAD	Packet Assembly/Disassembler
PPP	Protocol Point to Point
PRL	Preferred Roaming List
SIM	Subscriber Identification Module
RIP	Routing Information Protocol
RSSI	Receive Signal Strength Indication
RTS	Request to Send
WAN	Wide Area Network
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

10. SERVICE AND SUPPORT

10.1 PRODUCT WARRANTY, RMA AND CONTACT INFORMATION

CalAmp Corp guarantees that every Dataradio Vanguard 3G Cellular Modem will be free from physical defects in material and workmanship for one (1) year from the date of purchase when used within the limits set forth in the Specifications section of this manual. Extended warranty plans are available.

If the product proves defective during the warranty period, contact CalAmp Customer Service to obtain a Return Material Authorization (RMA).

10.2 RMA REQUEST

Contact Customer Service:
CalAmp – Dataradio
299 Johnson Avenue, Suite 110
Waseca, MN 59093-USA

phone: (1) 507.833.8819
fax: (1) 507.833.6748

BE SURE TO HAVE THE EQUIPMENT MODEL AND SERIAL NUMBER, AND BILLING AND SHIPPING ADDRESSES ON HAND WHEN CALLING.

When returning a product, mark the RMA clearly on the outside of the package. Include a complete description of the problem and the name and telephone number of a contact person. RETURN REQUESTS WILL NOT BE PROCESSED WITHOUT THIS INFORMATION.

For units in warranty, customers are responsible for shipping charges to CalAmp Corp. For units returned out of warranty, customers are responsible for all shipping charges. Return shipping instructions are the responsibility of the customer.

10.3 PRODUCT DOCUMENTATION

CalAmp Corp reserves the right to update its products, software, or documentation without obligation to notify any individual or entity. Product updates may result in differences between the information provided in this manual and the product shipped. For the most current product documentation, visit www.calamp.com for spec sheets.

10.4 TECHNICAL SUPPORT

Technical support hours: Monday to Friday 9:00 AM to 5:00 PM, Eastern Time

CalAmp – Dataradio Corp
6160 Peachtree Dunwoody RD., suite C-200
Atlanta, Georgia 30328

phone: (1) 770.392.0002
fax: (1) 770.392.9199
Email address: PSMGsupport@calamp.com